PROCEEDINGS

OF THE

THIRTY-SEVENTH ANNUAL MEETING

OF THE

FLORIDA STATE HORTICULTURAL SOCIETY

HELD AT

TAMPA, FLA., APRIL 22, 23, 24 AND 25

1924

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Florida State Horticultural Society

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WM. L. WILSON, Panama City

SECRETARY:

BAYARD F. FLOYD, Orlando

TREASURER:

L. D. NILES, Lucerne Park

EXECUTIVE COMMITTEE:

FRANK STIRLING, Gainesville; B. L. HAMNER, Tampa

H. HAROLD HUME, Glen St. Mary; President, Secretary and Treasurer, ex-officio

Constitution

Article 1. This organization shall be known as The Florida State Horticultural Society, and its object shall be the advancement of Horticulture.

Article 2. Any person or firm may become an annual member of the Society by subscribing to the Constitution and paying two dollars. Any person or firm may become a perennial member of the Society by subscribing to the Constitution and paying the annual dues for five or more years in advance. Any person may become a life member of the Society by subscribing to the Constitution and paying twenty-five dollars. Any person or firm may become a patron of the Society by subscribing to the Constitution and paying one hundred dollars.

Article 3. Its officers shall consist of a President, three Vice-Presidents, Secretary, Treasurer, and Executive Committee of three, who shall be elected by ballot at each annual meeting. After the first election their term of office shall begin on the first day of January following their election.

Article 4. The regular annual meeting of this Society shall be held on the second Tuesday in April, except when otherwise ordered by the Executive Committee.

Article 5. The duties of the President, Vice-Presidents, Secretary and Treasurer shall be such as usually devolve on those officers. The President, Secretary and Treasurer shall be ex-officio members of the Executive Committee.

Article 6. The Executive Committee shall have authority to act for the Society between annual meetings.

Article 7. The Constitution may be amended by a vote of two-thirds of the members present.

By-Laws

1. The Society year shall be co-extensive with the calendar year, and the annual dues of members shall be two dollars.

2. All bills authorized by the Society or its Executive Committee, for its legitimate expenses, shall be paid by the Secretary's draft on the Treasurer, O K'd by the President.

3. The meetings of the Society shall be devoted only to Horticultural topics, from scientific and practical standpoints, and the Presiding Officer shall rule out of order all motions, resolutions and discussions tending to commit the Society to partisan politics or mercantile ventures.

4. All patron and life membership dues and all donations, unless otherwise specified, shall be invested by the Treasurer in United States bonds. Only the interest on these bonds shall be available for payment of the current expenses of the Society. Perennial membership dues shall be placed on deposit at interest by the Treasurer. Only two dollars and the interest from each perennial membership fee shall be available for use in payment of the current expenses of the Society during any particular year.

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Lipsey, L. W., Blanton, Fla.
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Thirty-Seventh Annual Meeting of the Florida State Horticultural Society

The Thirty-Seventh Annual Meeting of the Florida State Horticultural Society was called to order by President L. B. Skinner in the Casino of the Tampa Bay Hotel, Tampa, at 8:30 P. M. on Tuesday, May 2, 1924. Owing to counter attractions, which included the last week of the drive for membership in the Florida Citrus Exchange under the auspices of the Lake Wales Chamber of Commerce, the attendance was not so large but interest in what was thought by many to be the best program that the Society has had in recent years, was very great. There was little of the usual disturbance of coming and going during the giving of the addresses and in the interim, that has frequently characterized past meetings. In spite of the lengthy program, the most of the audience remained until the last paper of each session was finished.

Tampa First Annual Flower Show

A feature of the meeting was the Tampa First Annual Flower Show which was staged in the foyers of the Casino under the direction of W. H. Knull of the Knull Floral Company of Tampa. While the Show was conceived only a short time previous to the meeting of the Society, a most creditable showing of flowers and foliage plants was made. In future years, this should be one of Tampa's most important annual events.

Assistant Secretary

In keeping with a resolution introduced and passed at the Thirty-Sixth Annual Meeting, authorizing the Executive Committee to appoint an Assistant Secretary, Mr. W. W. Yothers of Orlando was appointed to this position by the Committee at its meeting in Tampa in February, 1924.

Mr. Yothers is well known to the members and to the citrus growers of the State through his work and zeal in their behalf, as entomologist to the Bureau of Entomology of the United States Department of Agriculture.

The Secretary wishes here to acknowledge appreciation of his counsel and of his hearty co-operation in the work of

preparation for the annual meeting and in editing the Proceedings.

Acknowledgments

The number of individuals that contribute of their time to the work of the Society each year is quite large. The Proceedings gives credit to many of these. Others whose names do not appear in the Proceedings outside the membership list, give just as enthusiastically of their time. These individuals willingly do their part, expecting and desiring no commendation, taking their satisfaction in the knowledge that they have done their part in making the Society and its work a success.

The Society has been able to maintain its existence, its strength and its prestige continuously during near half a century through the work and interest of these individuals, and the State and the industry which profit from the work of the Society owes them a debt of gratitude.

Hart Gift

Among the older members there is a man who has given unstintedly of his time and energy and ofttimes of his money in behalf of the Society. During thirty-four years he has served as an officer of this Society, attending its meetings faithfully, often at a sacrifice to his personal interests and comfort. This man is Mr. W. S. Hart of Hawks Park.

For over twenty-two years he has carried in his will a clause bequeathing to this Society the sum of two thousand dollars. Feeling that the Society should wait no longer to have the use of this money, he was persuaded to purchase twenty shares of preferred eight per cent cumulative stock of the Florida West Indies Corporation which includes ten shares of bonus stock of the same corporation, which he has made out in the name of the Society and is presenting it to the Society in lieu of the amount of money named in his will.

Words cannot express the appreciation which every member feels toward Mr. Hart for his great spirit of magnanimity and for this material showing of his interest in the welfare of the Society and of his love for it. The Society owes him a debt which it cannot pay. His letter of transmittal is printed in this volume on pages 220 and 221.

Patron Membership

This gift of Mr. Hart supplements the Endowment Fund which the Society is building through its patron membership fees. It is with pleasure that the Secretary announces the addition of the names of the

Oklawaha Nurseries and Mr. F. G. Sampson to this membership list.

1924 Membership

While interest in the Society appears to be as active as ever as evidenced by the excellent program of this year and the attendance at the annual meeting, the total membership is again less than that of the previous year. The 1924 membership at the time of going to press is 1047 as compared to 1333 at the same time one year ago and to 1763, two years ago. The following table shows the distribution for the years 1923 and 1924:

	1923	1924
Honorary members	9	10
Patron members	37	39
Perennial members	13	12
Life members	130	130
Annual members—		
Out of State	151	102
In the State	993	754
TOTAL	1333	1047

PROCEEDINGS OF THE

Florida State Horticultural Society

THIRTY-SEVENTH ANNUAL MEETING

TAMPA, APRIL 22-25

1924

OPENING

Pres. L. B. Skinner: The time has arrived to call the meeting of the thirty-seventh Annual Meeting of the Horticultural Society to order. I understand there are twelve other conventions going on in Tampa tonight—this is the thirteenth; and also there is an election, so you can realize what we are up against, and I offer this as an apology for the people of my City of Tampa, who should have been here to help welcome you. I am sorry they are not here; it is a loss to both of us. Dr. C. E. Patillo will ask the Invocation.

Dr. C. E. Patillo, Tampa—Invocation.

Pres. L. B. Skinner: It is over forty years since the first time I set foot in Tampa. One of the first men that I knew in Tampa was the present Mayor of Tampa. I have learned to know him and admire him, and I take great pleasure in introducting to you Perry G. Wall, the Mayor of Tampa.

ADDRESS OF WELCOME

Mayor Perry G. Wall, Tampa

Mr. Chairman, Ladies and Gentlemen:

I have been introduced to quite a number of audiences in the State of Florida since I began to try to get notorious by running for office. This introduction is one of the best I have ever had, except that I had rather try to hide my age. I am not always willing to acknowledge that I am as old as Mr. Skinner has made me out to be. The introduction, however, is fine. It reminds me of the little boy in the class. The teacher says, "Johnny, how much is 3 times 3?" He says, "9"; she says, That's fine." He

says, "Hell, that's perfect." So this introduction is perfect, and different from most introductions. It is truthful to this extent—I am the Mayor of Tampa, unfortunately probably for the city. I am here tonight to tell you how very much pleased we are to have you with us.

An address of welcome is always easy to make, because we are pleased to have visitors; in fact, we rather make a point of inviting people to visit us, especially your kind of people. We don't have to add any special police to look after them.

Then again, the man who makes the introduction is not supposed to know anything about the subject that is under discussion, and if there is one thing I don't know anything about (and I believe you have found it out individually) it is cultivating the soil. Every man ought to get in love, because that teaches him romance; he ought to run for office as that teaches him business; he ought to get religious, that makes him spiritual; he ought to know how to farm, but he will need all of his religion, when he pays his bills.

I have just found that out. All of us, you know, business men especially, newspaper men, etc., know how to farm. Occasionally they start out and try it themselves, and then they have another fill in. I am getting off tomorrow to investigate a farm that I started about two years ago. I got one of these pamphlets showing how many hogs you could raise. This pamphlet had beautiful pictures. It told me how many pigs I could figure on, and I soon had enough pigs from reading this pamphlet to feed all the starving people of Russia. I started a hog farm, and I have got a pig every year.

As I said before, we are pleased to have you. These kinds of organizations, especially yours, which I understand is one of the oldest in the State, are of greatest value to the State, not only for the special good that they accomplish, but because it brings people together. Surely there is no State in the Union where there is more room for study and thought and co-operative effort than the State of Florida. With our peculiar climate, peculiarly good climate, and with our special advantages as to production and soils, we have opportunities here that no other section of the country has, and in addition to that—one that admits of more development and response to intelligent study.

So I congratulate you people in this Society. We appreciate this kind of work, not only, as I said before, for the special good it does, but because it brings people from all over the State together to get acquainted with each other. One of the characteristics of Florida is the way it is getting new people from all the different States, and from many foreign countries. Our population is not assimulated, only in one particular, we get them down here from the North and however good Republicans they may be we soon count them Democratic. But we have been thinking too much along community lines, county lines, sectional lines, and organizations such as this, business organizations, boards of trade, are helpful to get our people closer together, helping to create a public sentiment, helping to bring our Government, if you please, closer in touch with our industrial and commerical life.

From every viewpoint, this organization is one of the best in the State of Florida, and in behalf of the people of Tampa I want to welcome you here, and tell you that anything we can do to make your visit a pleasant one, and a profitable one, we are more than glad to do. I thank you.

RESPONSE

William L. Wilson, Panama City

Mr. Chairman, Ladies and Gentlemen, and the Honorable Mr. Mayor:

The Honorable Mayor told us that it was easy to make an address of welcome, with some flattering remarks on the end of it. I can simply pass the buck back to him, and say it is easy to respond to such a graceful address of welcome as he gave us.

Out in the wings here, just before we came in, the Honorable Mayor told me he had decided to stop making so many speeches, and that this was the last one, because he found he was falling off in weight in making speeches. Karl Lehmann and I got together and decided we would go on the speaking platform from now on.

We want also to tell you, Mr. Mayor, that the Florida State Horticultural Society is the oldest State Horticultural Society in the United States. It is the largest State-wide organization in the State of Florida, and is a State-wide organization that from its very beginning has had peace and harmony in its midst. They meet year after year, and have considered most of the most vital problems here in the State. They are meeting here in your fair City today with many things on their program, but the two most important things that they are going to consider are—First; the illness that has affected the citrus industry. There is no question about that most important industry in the State of Florida being sick; it is very sick today. Doctors disagree, although I believe the majority of them are beginning to come to a point of agreement. There are two angles to the citrus situation; there is the marketing angle and the angle dealing with the quality of fruit. I don't think the Florida State Horticultural Society, as a Society, is particularly interested in the marketing end, but they most certainly are interested in the quality end, and if this meeting can do anything to improve the quality of fruit, that is shipped from this State, we can go home and feel that we have done good work. The second thing that is going to be taken up at this meeting, and this evening's program takes it up more in particular, is the Beautification of the State; its highways, the home grounds, and everything in connection with ornamentals.

We have outside a flower show, which is the second flower show which has been held in connection with the State Horti-

cultural Society. We hope that you in Tampa will establish this flower show as a regular thing; that you will encourage the planting of flowers and ornamentals along the roadsides, in the home grounds, and everywhere where there is room for it.

We wish particularly to thank you, Mr. Mayor, for the kindness we have received in your City so far, and especially that received from the newspapers, who have been very good in saying in detail what we intend to do here. I think by the time this meeting is closed that it will add one or more pages to the history of this State, which we all hold most dear.

President's Annual Address

L. B. Skinner, Tampa

Life must flow through you. You take nourishment through food, but if you do not use it it becomes poison to your body. Only by taking it up and using it can it do its part or can you grow and remain healthy and well That seems to be a law of nature—life must flow through you.

If you have the desire to get knowledge, what does it profit unless you also have the desire to impart it to others—to use it for the good of others?

Wealth acquired and not used for betterment of others reacts to the injury to the owner—life must flow through you.

Knowledge acquired does you no good, unless you use it for the benefit of others. Just to possess knowledge is of no use; it is knowledge gone to waste.

Knowledge is power only when it is used and only when used for the good of humanity is it of any permanent benefit to the world. It is a great thing to get knowledge. It is a greater thing to impart it to others and thus make it immortal.

A few years ago, a Government representative, here in Tampa, succeeded in putting up orange juice so it would keep and taste fine. I tasted it myself and I know it was good. Shortly after he had discovered this secret, he was called to Porto Rico for some special work by the Department of Agriculture. He was taken suddenly ill and died. He left no notes of the process he had worked out and the knowledge of how to do it died with him. If he had written down his notes on this secret of inestimable value, or if he had passed it on to others, the world would be wonderfully richer for the work he did. As it is, he died and his knowledge went with him and all his work you may say, was for naught.

Life must flow through you. You must share your life with others. You must share everything you have with others to really live. If you have knowledge you must impart it, share it with others. If you have riches, you must share it to get a blessing out of it. The misers joy is really a hell. If you have strength, unless you use it, it will leave you. Life must flow through you. No man can live unto himself.

This is particularly true of the Horticulturist. Nature abhors a barren tree, and any man who does not produce in some way, who does not permit life to flow through him, is abhorred of nature.

It is the purpose of nature to produce fruit, flowers and seeds. She produces fragrant flowers which attracts the bees, and the bees in turn transmit the pollen to other flowers and thus perpetuates—per-

haps improves the plant, or the fruit it bears. The plant produces fruit that contains seeds. This fruit is carried over the earth by those who enjoy it, and thus the plant grows and increases by giving pleasure to others. It is a great vocation for any man to follow—to share in creating good and healthy things to eat—to grow fruits to be placed before a million people in thousands of cities throughout the land. To grow flowers and trees to make this good old world more beautiful in which to live—that millions of people may enjoy life more fully. It is a wonderful feeling to share the happiness of others. It is a wonderful feeling, a gratifying feeling, to know that one has contributed to the life, the health and enjoyment of men, women, boys and girls of this world and the horticulturist can be and should be happy in his work—of broadcasting health and pleasure.

Life is not all flowers and fruits it is true; there are weeds and cockleburrs and thistles and all sorts of evil things among the plants and their life is perpetuated, not by giving pleasure, but by sticking to every passer-by and stealing a ride to new fields where they may endeavor to destroy the good, and endeavor to crowd it out. The plant world is wonderfully like the human world.

There are many ugly customers as well as many useful and ornamental ones. There are many offensive ones, as well as many attractive ones. In fact, we sometimes think there are more of the bad than there are of the good.

It would seem as if every friend of humanity in the plant world had a host of enemies attacking it. Rare indeed are our friends in the plant world free from enemies, insects, and plant enemies. It is up to us to help each plant friend overcome the common enemies. You know them only too well, and every now and then you find a new enemy attacking your friends. We commonly say, "one damn thing after another."

We all condemn a barren tree. A barren plant is an abomination. Christ said "cit it down and cast it out." We approve and praise a plant that produces a heavy crop of beautiful fruit or beautiful flowers. It is letting life flow through it and producing something worth-while for others. It is serving humanity and its service is not an empty phrase. It is not just talk.

To be a producer, a creator of fruits and plants that make life for humanity happier and more joyful is worth striving for. It is letting a bit of Divine life flow through you to others. Not to let this divine fire kindle within you is to be bound up in yourself, with all the elements of decay present and ready to attack you. You can be dead while living. You must remember that life must flow through you to be worth-while—selfishness is destructive, unselfishness alone leads to real worth-while growth and happiness.

Opportunity is all around us. I would like to see a Paradise Road; a road dedicated to the living as well as a Memorial Road dedicated to the honored dead. I would like to see a road such as you have opportunity to build here in Hillsborough, or in Pinellas, or Manatee, or Polk, or any of the beautiful counties

near us here. I would like to see a Paradise road, bordered with flowers blooming every month in the year, with beautiful foliage plants banked behind it, and out of these, and crowning them, a double row of majestic palms, Cocos plumosa. I would like to see an annual sum of $10,000.00 or more provided in the budget to take care of this road and make it a thing of beauty and joy forever—not only to ourselves, but to thousands upon thousands of people who will in the future leave the dreary cold northern winter and spend these months in the land of flowers and palms—our Florida, where "it is summer time all the time," and where the cities are sunshine cities in the winter time.

You have your suburb beautiful, your New Suburb Beautiful, your Beach Park and all of that—parks in name only. You don't realize what beautiful spots parks can be made. You don't realize that money spent in beautifying will bring back a thousand-fold returns, and be a joy unspeakable to thousands of your fellow men. Paradise road—in fact. It can be done.

You, here in Tampa, have an opportunity of excluding easily the range cow and the razor back hog from all of the Peninsula bounded on the north by Tampa and West Tampa. Two or three miles of fence on the north side of the road from West Tampa to Sweet Water would do the trick. Proper gateways through this fence—those for autos always open, and those for horse drawn vehicles made to open easily. One man, a good stock man, can easily keep the stock driven out or rounded up. This much you can do, and you have before you an opportunity of a beautiful development that you should lose no time in improving.

You, who have taken a trip across the ocean, can realize and you who have not, can visualize this situation. You occupy a little space six feet wide by seven feet long, called a stateroom, and in this small space you may live your life for five or six days. It is up to you whether you do or not. Perhaps you wake up in the morning and look out of your port hole onto a troubled sea. You see a black threatening cloud bearing down on you—everything looks black and threatening—you picture to yourself all the horrors of a storm at sea, but perhaps you have courage enough to get up and dress and climb up on the upper deck of the boat, and, to your astonishment, the sky is blue, the Sun is shining—everything is gay and joyful. You look out over the beautiful blue water in amazement and the only cloud you find is the one just opposite your own port hole, and as you look at it, it slowly dissipates and passes away, not a cloud to be seen and every where is blue sky. How much of our lives do we spend in a little 2x4 space and our outlook on life is through a little port hole and the world we see is just our own troubles—little troubles. If we could only get up on deck where the sky looks blue and the sun shines, our troubles would seem small, and soon disappear. We cannot spend our lives thinking of just ourselves—just looking through a port hole. We must let life flow though us and think of others. Share the world with others; seek to make the world more beautiful for others, and in letting life

flow through us to others we will have a greater life to live, a deeper and broader outlook. We can see beauties we never saw before. We can look down and see the flowers in our path. We can look up and realize some of the supreme moments of our lives—as if we gazed on Mt. Blanc.

As I recall a brief trip to Ireland in 1913, some of the strongest impressions and most delightful thrills I received were about flowers. As we passed through the Gap of Dunbow, we came to a little park, and along the sides of the paths of this park there were ditches. I suppose at one time these ditches looked like the ditches in Florida along the roadsides; ugly, dirty, unattractive; just ditches, but as I saw them they were carpeted with the most beautiful carpet I ever saw—a carpet of forget-me-nots. Perfectly wonderful was this sight of millions and millions of forget-me-nots—true to name, was this wonderful carpet of forget-me-nots. And in the immediate near territory the fuchsias grows wild—fuchsias every where. I saw them in the woods, in the yards, in the parks, and at one place I saw them trained up on sides of buildings twenty feet high, and again in the parks as umbrellas with the beautiful fuchsias pendant hanging down underneath; a sight I shall remember always. And again I recall the park in Dublin; here the most beautiful beds of Violas—a cross between violets and the pansy; gorgeous violas never to be forgotten.

We should not be content with just a few oaks planted on our highways. We should get out of the little cubby-hole of our stateroom; get a broader outlook Plant our highways with banks of flowers and foliage and palms. If we make our highways beautiful, people will want to linger, won't want to speed over them like mad. We should make parks of our highways. People who come here expect to see Palms and Flowers. Palms and Flowers everywhere, Oranges and Grapefruit. We have plenty of oranges and grapefruit; plenty and to spare, but we are shy on palms and flowers. We have some beautiful spots ruined by sign boards. How much more delightful would be a cluster of Palms in a bank of flowers.

Plant avenues of Palms, but don't plant them in the manner that I saw men planting trees and Oleanders in the Memorial highway. It is a wonder they have done so well. Prepare the ground, the place that is to be the home of these Palms for a century, perhaps. Prepare this home with care. Dig deep and fill the home of the Palm with the soil it delights in, and when it grows up it will delight you and others. Plants live for others—can we do any more?

I want again to advocate what I urged last year, a "Plant-a-Palm-Week" all over Florida. Plant them by the thousands, and have them planted by people who know how. It is a crime the way some people plant trees and Palms. What more beautiful than an Avenue of stately Palms? I'll tell you. Put a border of beautiful flowers, then a bank back of these of foliage plants, and out of this bank of foliage let your palms grow, your Cocos plumosa. A suggestion for your Paradise Road.

In order to get it in permanent shape, as well as to bring it to your attention. I am going to quote a few paragraphs of a letter from Dean Alvord, of Harbor Oaks, Clearwater, Florida. The words tell of a life devoted to beautifying certain definite spots of this earth, and of the crowning feature of that life in Harbor Oaks, Clearwater. I know he would like to do more—keep on and on, but life is too short. Some one else must 'carry on' the work he began. I quote from his letter.

"In laying out the grounds about the average house, maintain an open center and carry a massed border planting about the edges of the lot; planting the courser, larger shrubs and darker foliage on the extreme margin of the lot; in front of this medium sized shrubs, graduating down to the dwarf plants on the inner margin, giving a banked effect in the view from the windows of the house. In these borders it is wiser to plant larger numbers of the same shrub than to plant one or two of this, that, and the other. Color can be introduced at intervals by the introduction of variegated or colored foliage which will contrast well with the various shades of green.

If coniferous evergreen shrubs are to be used they should form the back ground for the other planting. Second; or perhaps of equal importance in the planting, is the clothing of the foundations of the house, for this purpose plants of finer foliage and dwarfer habit are preferable. These should be planted in angles and about the corners of the house and piazza to soften the lines and tie the house to the ground.

In addition to the above, small plantings can be made at the intersection of the walks and drives, and here a single variety should be planted in a group. Palms of the Cocos plumosa look very well planted at intervals right in the shrubbery border, where they are rather more effective than scattered profusely about the lawn."

At the risk of being accused of repeating myself. I cannot close my talk to you without mentioning a subject in which we are all interested—vitally interested. It means everything to most of us Horticulturists. I want to say a few words about it. You know that Ponce de Leon started the style hundreds of years ago of coming to Florida searching for the Fountain of Youth. There are perhaps almost as many who came searching for a buried treasure chest.

But I am concerned with those who are seeking the Fountain of Youth. It has never occurred to any one to search any where else for this fountain, because it is universally agreed that it is in Florida. Some claim Ponce de Leon found it in DeLeon Springs; some claim Altamote Springs; some claim Espirtu Santa Springs. I am not concerned with Ponce de Leon, but I am concerned for you and for myself. I want to say I have found it in the Florida Orange and Grapefruit—in the *Ripe* Florida Orange and Grapefruit. I have found that many people besides myself have found that the fountain of youth lies for them in the Florida Orange or Grapefruit.

It is available to every man and woman. If they will consume their "daily dozen" of oranges and grapefruit. Find

out how many oranges or grapefruit make a safe "Daily Dozen" for you and then consume it daily. Therein lies the fountain of youth.

Oranges will dissolve the uric acid in the blood. It will keep the blood pressure at normal. It will keep the skin fresh and young looking. In fact, it will come nearer restoring youth than any other food that is available to man. We know that the juice of ripe oranges and grapefruit are the greatest of medicines and foods. We know that the juice of ripe oranges is the best possible food for infants and that it is necessary to the best development of the child. Experiments recently conducted over a period of eight weeks showed that the children who were given a ripe orange in the middle of the morning, gained more weight than the children did who were given a half pint of milk. We know that orange juice will tend to eliminate uric acid from the blood, and that therefore, it is the best medicine for rheumatism. We know that orange juice is one of the best medicines because it is rich in vitamin. These things have been proven; they are not mere statements. It will reduce high blood-pressure. It will help the babe to attain the best possible development.

We know that in flu epidemics people cannot get enough oranges and grapefruit. Why not eat them and keep well? A daily dozen will do the trick, keep you young and keep you well. Middle aged people are daily drawing on and consuming the great margin of safety that nature has lavishly given them. Why not conserve this by eating oranges and grapefruit? How to get this knowledge to the people, to the men and women that the best health preserver is oranges and grapefruit, is the problem.

I went last fall to the Battle Creek Sanitarium. They gave me oranges every meal for six weeks. They said they liked Florida Oranges best because they were sweetest. My blood pressure when I went there was 200. They reduced it to 140. A perfect normal for my age.

A daily dozen will solve the ills of humanity and our problem as well. A daily dozen and youth. No daily dozen and age. And if the people will realize this there will be no lack of market. Ripe oranges, no uric acid, no rheumatism. Grapefruit and no old age. They are both the Elexir of life; both rich in vitality, vitamins. Let us push the daily dozen idea.

If one third of the people of the United States consumed a daily dozen, it would take six hundred million boxes to supply them. If one-fourth of the people would consume half dozen a day for six months, it would take one hundred and fifty million boxes. A glass of orange juice contains as much nourishment as a glass of milk. A glass contains two and one half Florida Oranges and four California Oranges. Three glasses of juice a day will do the trick almost. One glass at each meal. It is a wonderful drink. I know, I am drinking it three times a day and every one is saying how well I look. I have been doing it now for months. I am getting younger every day. Try it yourself. I mean honest to goodness Florida Orange Juice.

Eat or drink your daily dozen. Keep young. Eat Grapefruit, which should be called "Old Age deferred."

National Garden Week

Mrs. Jack H. Pryor, Haines City

Mr. President, Members of the Florida State Horticultural Society, and All the Rest of You:

I am very glad to speak tonight on the subject of National Garden Week, a movement yet in its infancy, and one that means so much to our community, a democratic and patriotic move. It is a movement that benefits every man, for it follows out and it fosters civic pride; it adds to individual comfort and happiness; it enriches prosperity, and it enhances the value of our property today.

I am especially glad to speak on this subject in a county that is so awake, so enthusiastic and interested along the lines of beautification. When the Commissioners in all of our counties become as keenly interested to the needs of beautification as Hillsboro, we may rest assured we will have, all over our State, beautiful highways.

I am glad and honored, Mr. President, to speak before your organization, at the Thirty-Seventh annual meeting, and to you who have been working and done much toward the development of Florida, and I dare say if your organization had its way there would be such protection of our native growth that in a very short time our State would become truly a State Beautiful, and not in spots but all over.

To help in this movement of making not only our State, but our whole country better and more beautiful, is the object of National Garden Week. It was founded by the Editors of the Garden Magazine, January 1923, trying to arouse civic interest in gardens.

By the plan adopted by the General Federation of Womens Clubs, every government, every State Agricultural College and all Superintendents of Education have been asked to co-operate, and I understand a majority of them are co-operating. There seems to be a general awakening to the needs of Beautification. It leads one to the higher plane of living; it makes better citizens of us, and adds to the looks of our country, making it more beautiful and restful to the eye.

From the success with which the National Garden Week was carried through last April, and the interest it has created all over our country it appears National Garden Week is going to prove an annual and national occasion. This is National Garden Week, April 20th to 26th, and while in most States it marks the planting of gardens, it rather marks the combination of our efforts, as flower shows over our State prove.

However, to meet the special needs of Florida, auxiliary Garden Week was observed first in November, 1923. You know before the war we all gardened to help our country, and now that the passions of war have past, we can still garden to help our country. We can show the world that men, women and children can work together harmoniously in times of peace, when the movement has as its object the betterment of our country. So that the interest gained and enthusiasm made during the war have made gardens more popular.

It appears that the old time gardens of our grandmothers are going to return to us with all their beauty. The founders of National Garden Week would have everyone know the joys of growing plants, and would have us know vegetables and flowers, so that the mistake made in Madison Square Garden, in New York, would never be made again when someone called a strawberry a radish. That really happened.

National Garden Week is rich in possibilities for us, even though the season does not exactly fit Florida conditions for planting. There are many things we can do. It gives us an opportunity to arrange a clean-up campaign. The elimination of road signs does just as much toward beautifying, as planting. Lets get rid of all the old signs, dilapidated fences, fallen down houses. Let us brighten things up with just a bit of fresh paint and whitewash. If we did that in Florida we would do much toward making our State more beautiful. It gives us an opportunity to arouse enthusiasm, so that when our Garden Week comes in November we can put on pictures at the theatre and lectures, explaining the psychological effect of gardens on our people, and the need of vegetable diet and exercise. Vegetables will furnish both of these—vegetable diet and exercise.

It gives us an opportunity to offer prizes to our school children and grown-ups, and it also gives us an opportunity to arrange planting, and to begin now to see that our public lands are beautified next Fall; to see that our factories, our jails and hospitals are beautified. Beautiful surroundings have a wonderful effect upon character, and if we give people a better example, which will pass on to our citizens of tomorrow, we know that the fate of our Florida, which rests in their hands, will be assured. I would stress that in our schools and orphanages the children be allowed to make plantings, under proper supervision, so that it may be instilled in them through life, and that we may be assured that the beautification work that we are doing now will be carried on by them. Then it is well to let children know that honest labor is honorable, and just as honorable as labor with the brain.

The hope of the Founders of National Garden Week is to make us real lovers of the beautiful. To start in, our people need to take more interest in Horticulture and nature, and they should be educated so that none will be willing to live in homes, no matter whether in humble homes or in a palatial mansion, without harmonious settings, in keeping with the style of their home, and grounds. They

hope to make us love beauty, so that we may live and appreciate the gospel of peace, contentment and beauty, which is found in fresh air and sunlight, and with the miracles wrought with a few seed and earth.

If all of us in Florida were to start trying to make life better and more beautiful, wouldn't it be a wonderful sight, and wouldn't our Florida soon become a bird of Paradise?

Let us agitate Garden Week, and let us not only take it out in talk, let us have action. Let each one of us do our bit.

Making Florida the Land of Flowers

Karl Lehmann, Orlando, Chairman, State Beautfication Committee, Florida Development Board

The name "Florida" means Land of Flowers. We can make this state literally that kind of a land if we will give a little more careful attention to our opportunities along these lines. Florida's climate is the finest to be found in any part of the world. Florida's soil will produce the finest kind of flowers. This is best evidenced by the profusion of wild flowers that cover our roadsides and fields. Many of these wild flowers are sacrificed every year to the selfishness and greed of certain folks who burn off our woods utterly destroying the natural beauty of great sections of our state.

If we are to make Florida the great land of flowers she should be we must agitate for the fencing of the range cow and stop this contemptible practice of burning off the land.

There are a great many things that can be suggested in this effort to make this state a land of flowers but we will do well to confine ourselves to the more common and popular opportunities.

1. There ought to be a consistent and persistent effort for the planting of trees and palms. It would be a simple matter for each class in our public schools to arrange to plant one tree on Arbor Day each year. It would be quite as simple a thing for our civic organizations such as Rotary, Kiwanis, Civitan, Lions, Exchange, Optimist, etc., to plant a mile of trees each year on the highways adjacent to their city. The expense would not be great but the results in a few years would be of untold value to our state. The man who plants a tree or palm in Florida today is not only adding to the enjoyment of those now living here but is reaching down into coming generations with a hand of helpfulness and beauty.

2. Wonderfully effective work can be done in roadside planting by the use of great masses of such subjects as the petunia, periwinkle, phlox, Blue African Daisy, Painted Daisies, Annual Lupin, miniature sunflower and similar flowers. These can be sown from seed, or plants taken from seed beds and reset on the highways. Many of these flowers will re-seed themselves year after year and lend color and beauty to our roadsides.

3. The use of oleanders on the highways set between oaks and palms is one of the best things that can be done to lend color and beauty to our plantings along our beautiful roadways. With just a little concerted effort we could easily plant 10,000 trees and 10,000 oleanders a year along the main roads of this state.

and such an effort would soon show wonderful results for Florida.

4. In my opinion we will make a mistake if we do not plant great quantities of the brighter and showier flowers in Florida. It has been said that nowhere in the world save possibly the exception of the Hawaiian Islands does the hibiscus do so well as in our state. Nothing is so cheering and pleasing to one as he drives through Florida as the bright colors of the brilliant hibiscus in their various tints and shades. This flower lends itself to so many kinds of treatment, it can be used as a bush in many places, it makes a fine hedge, it can be trimmed into beautiful form and shape and serve a dozen other purposes as an ornamental.

5. Florida has some wonderful flowering vines, chief among which are such beautiful plants as the bignonia venusta (flame vine,) the bougainvillea, wistaria, and those of lesser color, the star jasmine, cherokee and McCartney roses, etc. These will cover arbors, mass themselves on roofs, follow into the heights of our stately pines, trail over fences or form solid ground coverings. Whichever way they are used they form a mass of beauty and color that is seldom equalled and never excelled.

6. For the home garden, about the grounds of schools, churches and other public buildings, magnificent beds of roses, gorgeous plantings of gladioli and dozens of other splendid flowers and shrubs are useful and beautiful. Nasturtiums, pansies, sweet peas and many of the other beautiful garden flowers are very valuable about the home place.

7. The holly, the bamboo, arbor, vitea, etc., make wonderful ornamentals for the yard, while to many there is nothing more beautiful than a plantation of bananas along the edge of a lake.

8. In the low, wet places the iris (flag) and many other similar flowers do well, and prove interesting and inspiring to residents of and visitors to Florida.

A SUGGESTION

Many communities have made wonderful success of planting days. A poinsettia day in the spring when these gorgeous plants must be cut back and the canes can be set in the ground, has been the means of a complete transformation of little communities where as many as two to ten thousand poinsettias can be set in a single day, everyone doing a little in this line. Other communities have a day in which they set the oleanders, which is easily grown from cuttings. Hibiscus, bignonia, and many other similar plants can be bought in large quantities at low cost. Why not a planting day for your community?

Then for the larger towns and cities let certain streets specialize on flowers of a kind. One street might be literally Hibiscus avenue, another Oleander street, still another Bignonia Way, while wistaria could form the base of the plantings on another street, bougainvillea on another, and thus certain streets will become

known for the plantings that predominate in that section. Ferns can be used in one place, petunias, phlox or half a hundred other beautiful plants or flowers can be used with success.

Florida will become literally the "land of flowers" when each of us does his part to bring about that happy result. What are you doing or what will you do this year to make it the "land of flowers?"

Some Observations on Citrus Root Stocks

R. E. Skinner, Tampa

The first groves planted in the state of Florida were seedling groves. But soon budding began from particular trees which in turn became known as varieties because there were certain characteristics which these parent trees possessed that it was desirable to reproduce uniformally throughout the grove.

The question of root-stocks was next. Many have been used but years of experience have finally practically eliminated all but three or four—sour orange, rough lemon, grapefruit, and trifoliata. Each have qualities that make it more desirable than another under certain conditions affecting the factors of grove production.

Let us consider what are the factors influencing the comparative yield, quality of fruit and life of any particular citrus tree of any particular variety. They are:

(1) Variations in the individual tops due to bud variations or mutations;

(2) The kinds of root stocks used and their characters collectively and individually;

(3) Congeniality of root stock and scion;

(4) Nature of the soils on which they are grown;

(5) Susceptibility to disease and insect pests and the degree of control exercised over them;

(6) Methods of cultivation and fertilization used;

(7) Hardiness of the combined tree and stock, and climatic adaptability.

Let us see how these factors influence the choice of a root stock, or having already a grove, what influence the stock has on the yield, quality of fruit and life of the tree.

Let us consider the factor of hardiness of the root stock and its influence on the tree. Trifoliata is the hardiest of all, and as it thrives best in northwest Florida it is sufficient to say that there is where it belongs. It is not generally suited to south Florida.

It is conceded that the sour orange root is more cold resistant than grapefruit or rough lemon, and desirable for that reason wherever soil conditions or cultural methods will permit of its use. It tends to keep the tree in a more dormant condition throughout the winter. Grapefruit root stocks are probably more hardy than rough lemon but I believe have a strong tendency to grow with every warm spell during the winter period.

The factor of congeniality of stock and scion is an important one. We know that a sour orange root and a satsuma bud is an incompatable combination. This is an extreme case of lack of congeniality. But it is apparent to the careful observer

that the sour orange is characteristically more like the sweet orange varieties than is the rough lemon, in rate and nature of growth, in the period of winter dormancy and in character of fruit produced. The pineapple orange bears out this factor very clearly by producing fruit of higher color, smoother texture and less rag on sour stock than on the lemon root. The practical value of this congeniality of root and scion is well illustrated by results of sales made by one member of the Exchange this season. This man had pineapple oranges on both sour orange and rough lemon stock in the same grove but he packed the two separately and sold them on the auction at the same time. The fruit from the sour orange root netted him from $1.50 to $2.00 a box on the trees, whereas those from the lemon root netted less than fifty cents.

The Parson Brown develops its color, sweetness and character satisfactorily on the sour orange stock whereas it is not satisfactory on lemon. Valencia oranges retain their juice and characteristic flavor longer on sour orange than on rough lemon. Some maintain that after an orange tree on rough lemon root attains a certain age it improves in quality, but I doubt if a lemon root tree ever got old enough to improve sufficiently to equal the same variety on sour orange. The tangerine is probably not any to congenial with either rough lemon or sour orange but will undoubtedly retain its quality later in the season on sour orange than on lemon.

With grapefruit varieties, however, the lemon root seems quite as congenial as the sour orange. One would naturally suppose grapefruit on grapefruit root would be an ideal combination of scion and stock. But experience seems to refute this except in a few instances. Grapefruit stock seems to incline to alternate bearing or even to a still greater degree of uncertainly of production. It is interesting, however, to note that in this matter of congeniality, grapefruit will hold pineapple oranges on the trees longer than either sour orange or rough lemon. It also tends to produce a tough, more leathery peel in round oranges than does either rough lemon or sour orange.

The nature or kind of soil on which fruit are grown is an important factor influencing not only the quality of fruit produced but the stock on which the trees should be grown. The natural habitat of the orange in Florida is in the rich hardwood hammocks. The quality of fruit produced here is far superior to that on higher drier soils which we hear so often spoken of as citrus soils. This is a misnomer for which the use of lemon root stocks is responsible. The freeze of 1895 drove the citrus growers from the rich hammocks of northern Florida to the sand hills farther south, and on these sand hills lemon root produced quick results. Taken in their native habitat, the heavier richer soils of the state, it is doubtful if trees on lemon root will grow any faster on lemon than on sour orange stock after the first two or three years. But on the Norfolk sands of the rolling phase the lemon root is at home. It grows far faster and produces paying crops at an earlier age. For volume of production on sandy soils, the lemon root is superior to sour orange or grapefruit and

has only one rival. This together with its ability to resist drought are its only redeeming features. On these soils sour orange and grapefruit root may be used, but more attention must be given to adding humus to the soil and building it up to a condition of sufficient fertility. The lemon root will stand more variation in moisture supply than the sour orange or grapefruit, and will stand up under more severe conditions of drought. On the other hand sour orange and grapefruit roots are more tolerant of wet soils, but even with them it is well to secure good drainage to a depth of two or three feet.

As to the susceptibility of root stocks to disease, the chief malady is foot-rot or Mal-de-Goma. Foot-rot has eliminated many trees on lemon as well as sweet orange root and even the grapefruit root is subject to its attack. Sour orange is quite immune to this disease.

Methods of cultivation used on different soils materially affect the growth of trees and quality of fruit grown. Here is the first opportunity for the grower with oranges on lemon stock on high sandy land to improve the quality of his fruit. It is customary to cultivate the young non-bearing groves intensively, and this method is continued to a large degree after the trees come in bearing. This artificial stimulation of root development tends to upset the normal equilibrium in the tree and though it produces perhaps larger crops, it also makes the fruit coarser than it would otherwise be, and induces drying out of the fruit at the stem end early in the season. If we will stop ploughing our lemon root groves after they come into bearing, harrow and hoe sparingly and shallow, use the mower to keep down a too rank growth of grass, we shall soon be approaching that much desired goal of high quality in our product, with greater satisfaction to the consumer and larger net returns to ourselves. I have eaten mid-season oranges and tangerines this month, grown on lemon root under non-cultivation that were full of juice and of fine quality. With non-cultivation, a chemical fertilizer should be the principle kind use, but an occasional application of well rotted organic material worked in very lightly will help greatly to maintain the proper physical and biological conditions of the soil.

So much for the influence of the different kinds of root stocks taken as a whole. Let us now consider the individuality of seedlings used as root stocks. We know that Mr. Shamel in California has shown us a very important variation of individuals of a single variety where the difference was due to bud variation. How much more is it to be expected that we will have even greater variations in the individual seedlings to be used for root stocks where each individual is a new and distinct being subject to all the variations inherent in seed reproduction.

Dr. H. J. Webber in California has pretty conclusively proven this to be a fact and further, he has shown us how to select these seedlings to greatly improve the vigor and size of budded trees in any grove to be planted. We know it to be a fact that in the past the nurseryman has obtained a quantity of seed of rough lemon, sour orange, grapefruit or whatever variety or rather I should say class

of root stock he wished to raise. He planted the seed. Transplanted the seedlings from the seedbed to the nursery row without much regard for the very considerable variation in size, thriftiness and type of the individual seedlings. Then he budded them and later sold them out—the larger ones first, then the intermediates and later perhaps after a year of waiting cleaned up the block by selling out what had been the smallest ones.

In all probability those first large trees sold grew uniformally well and made large trees for their age and produced large crops. The small ones sold out a year later in all probability produced a grove of great irregularity, falling further and further behind the first ones in size and productivity.

A few figures and statements here on the work of Dr. Webber will serve to bring out the point, also show how great is that difference in individuals of the same scion parentage, but on different individual roots of the same kind or variety.

In 1914 a batch of sweet orange seedbed stock was sorted over and 15 per cent of small stock discarded. The rest were grown in nursery form for one year and then budded to navel, Valencia and Marsh Grapefruit. In 1917 an inspection showed the nursery to be a more than ordinarily uniform one in the size of the trees, the buds being then two years old. Small trial plantings of different sized nursery trees were made using small, intermediate and large trees from this nursery. These were planted on uniform soil arranged so that there was a row of large trees, then a row of small trees and then a row of intermediate ones.

In 1919, after two years in the grove the differences in size were just as marked as in the beginning and in the same relation to each other. The degree of difference in size of one group over the other was approximately two years growth. Expressed in cubic feet occupied by the tops we have some very interesting figures:

In April 1919, after two years in the grove.

Variety	Large	Intermediate	Small
Naval Oranges	31.25	11.68	7.25
Valencias	16.78	9.03	7.49
Grapefruit	15.24	9.16	6.17
In May 1922, five years in the grove			
Navels	190.	118.	89.65
Valencias	286.	170.	179.
Grapefruit	286.	219.	147.

Each set of trees has retained its same relative rank with the single exception of the "small" Valencias which have a very slight lead over the intermediate Valencias.

While there are no definite figures available yet as to the relative yields of these sets of trees, observations made at different times establish the fact that the yield on the large trees has been far heavier than on any of the other grades, and approximately it has been double that of the small trees.

This experiment of Dr. Webber's out in California ought to make us sit up and take notice the next time we plant any trees. There is one sixty acre Valencia grove (owned by William Hertrich) two miles from Pasadena, California which is

a commercial planting and which by mere chance bears out this fact of variation in vigor of individual root stocks to a surprising degree. Briefly the history is this:

Ten thousand sour orange seed bed stock bought in 1913. Five thousand smallest discarded. Five thousand nursery trees obtained. The largest of these budded in Spring of 1914, rest in Fall of 1914. Twenty acres planted July 1916 with the selected largest trees from above mentioned block of nursery, then in March 1917, 20 acres planted with second selection of intermediate trees, and finally 20 acres planted April 1917 with the residue. After five years: First block; trees unusually large, vigorous, uniform and fruitful. Average height ten feet. Second block; trees made fair growth, rather uniform but some undersized trees, and practically none as big as smallest in first block, averaging five to seven feet high. Third block; very irregular in size, mostly small unsatisfactory trees, averaging four to five feet. In other words the first block has twice the bearing area of the second block and four times that of the third block.

The moral is, select a good type of trees from which to take your seeds, cull them mercilessly and prodigally in the seed bed, do it again in the nursery before budding, and then select only the best buds for planting. The trees will cost twice as much, but the resulting grove will be worth four times as much when it comes in bearing.

I believe there is a way for us to correct this variation in individual trees even after the grove which has been planted with the nursery run of trees, has attained bearing age. Top work them on the bottom. Get the most vigorous sour orange seedlings (if you have a sour orange soil) plant three or four at a forty-five degree angle around the trees, so that as soon as they become established they can be inarched in to the bearing trees. In two or three years you will have doubled the root system of these trees.

And this brings me to the hope of the rough lemon root grove owner who wants to improve the quality of his fruit. I spoke a few minutes ago of non-cultivation as a step in the right direction; but I believe there is another way; that is by infusing a new strain of the desirable kind into that root-system. I mean inarch those trees with Cleopatra seedlings.

And from now on through this talk I am going to take the part of Antony and tell you of the virtues of this Queen of Root Stocks, Cleopatra.

You all know the old saying, "Handsome is as Handsome does." Well that's Cleo all over.

Let us go back and review those factors that I mentioned as determining the yields and quality of fruit and see how easily Cleopatra wins the "bathing beauty" contest.

Firs t there is hardiness. Cleopatra seedlings at Gainesville in January 1924 were but slightly affected by a temperature of 22 degrees while sour orange was badly scorched. Cleopatra is fully thirty days in starting growth in the Spring. This characteristic of Cleopatra of being more completely dormant for a longer period will tend to make the trees budded

on it not only more hardy enabling them to stand lower degrees of temperature, but also more consistent bearers.

Concerning root-stock and the cold resistance shown at Gainesville during the January 1924 freeze, Mr. O'Byrne says, "In each and every case that I know of rough lemon seedlings were killed clear to the ground here at Gainesville, grapefruit seedlings were next, and were almost as severely damaged as the rough lemon. Sour orange seedlings were much more cold resistant, but they were killed back badly. We had some bitter sweet stock in a different part of the nursery which with a few exceptions was unhurt by the cold. Unfortunately we could not draw any conclusion from this as they were on much higher land than the other seedlings referred to. However, we are inclined to believe that the bitter sweet tree is more cold resistant than the sour orange. Cleopatra seedlings in rows immediately adjacent to the rough lemon. sour orange, and grapefruit seedlings of the same age, were much more cold resistant than any although they were in full growth at the time of the cold. It seems that for some reason they are not as severely damaged by cold when they are in full growth as the three previously named varieties. Almost none of them were killed to the ground. We have been greatly encouraged by the showing made by Cleopatras at Gainesville during the January freeze. I am also told that the Cleopatras came through the freeze in Alabama. I can not conscientiously say that at Gainesville they were as cold resistant as trifoliata, but they made a good showing and I presume the same statement could be made for Alabama.

Second comes congeniality of root stock and scion. Unquestionably Cleopatra is more congenial to all kid-glove varieties, and from all appearance is as thoroughly desirable for round oranges on low lands and even more desirable on high lands.

I do not believe that Cleopatra will produce as highly colored Pineapple oranges on low clay or marl lands as will sour orange.

Third there is the matter of soil adaptibility. Cleopatra rivals the rough lemon in vigor of growth on high sandy soils, suffers no more from drought, has a more ideal root system and can carry prodigious crops through severe drought without any apparent weakening of the tree.

Fourth this stock seems to be immune to scab and footrot.

Mr. Reasoner, of Oneco (to whom we are indebted for the introduction of this variety as a stock) says that the size of the fruit is fully as large on Cleopatra root as on lemon or sour where ever the crops are smiliar enough in amount to be comparable.

I believe its habit of becoming thoroughly dormant in the winter is a valuable one for two reasons. First, trees budded on it are likely to be more consistent croppers than those budded on stocks which keep growing during warm winters. And second, trees budded on this stock will retain their quality, juice and character much later in the season than trees budded on lemon or even on sour orange.

The rate of growth of Cleopatra seems to lie between sour orange and rough lemon, and approaches the latter so closely even on sandy soils as to make this advantage of lemon quite negligible when the other advantages of Cleopatra are considered. I don't believe there is anything that promises so much for the salvation of the lemon root groves on the sand ridges as does this inarching of Cleopatra seedlings.

I believe it is to be the coming stock for citrus in this state and that it is superior to anything else we have for 75 cases out of 100.

Member: Mr. Skinner, is it a difficult matter to get Cleopatra seed?

Mr. Skinner: There was difficulty two or three years ago, but there seems to be some all over the State now. Mr. Reasoner sent out a number of them in 1910, or previous to that, and the cold spells of different years have frozen the buds back, and the owners of the properties, either through neglect or not being able to recognize the sprouts from the root have let them come again, and there are a good many scattered over the State. The supply of seedlings is increasing.

Member: Is there any indication of scab on the fruit itself?

Mr. Skinner: I have never seen it on the Cleopatra.

Member: How old are these seedlings?

Mr. Skinner: One year old.

Mr. Coachman: How do you find the germination of the seed as compared with rough lemon or sour orange?

Mr. O'Byrne: Very slow.

Mr. Coachman: How does it act after it gets out of the ground?

Mr. O'Byrne: It continues to be slow for one or two months. After it is established it comes rapidly, but not as fast as the rough lemon. There are two or three points which I wish to bring out at this time. In the first place, you have heard some discussion as to the kind of root stock the original Temple tree is budded. It is on grapefruit root stock. If any of you have been in doubt you have the information at this time.

Mr. Skinner did not mention one stock that is going to be a contender in a certain section, sweet orange stock in the Ridge Section. Since there is no Cleopatra stock in that section, no person knows how it will do. The specimen shown seems to indicate it will do very well, but we know nothing about it. If it is planted in that section, the grower is taking a shot in the dark; on the other hand there are numerous groves in the Winter Haven section that are on sweet stock, and I have yet to meet a grower who is not completely satisfied, and practically all of them think it superior in that particular section. Please note that is for the high pine land sections. Where the soil has any tendency to be

wet it would be inadvisable to plant on sweet stock, because of foot rot. I went through groves 35 years old, and didn't find a single case of the disease. The Florence Villa Hotel Grove, which claims to have the record of production for the State, has averaged $1000 a year net, and it is on sweet stock. They have Valencias and Tangerines in that grove, and they are both splendid.

Breeding Work with Reference to Citrus Stocks

T. Ralph Robinson, Bureau of Plant Industry U. S. D. A., Washington, D. C.

In accepting my assignment to the committee on Citrus stocks and varieties this year, I did so with the reservation that the commercial field would be covered by the other members of the committee. For my part, I wish to bring to your attention some of the possibilities that lie in the direction of plant breeding and a few of the results already fairly well on the way.

You have long been familiar with the fact that certain varieties seem peculiarly adapted to certain stocks. The reciprocal influence of stock and scion is a fascinating and perpexing problem, one in which faulty knowledge or a bad guess may lead to disheartening and expensive failure. In most cases *congeniality* of stock and scion can be only determined by actual test, while it is possible to predict fairly accurately the *adaptability* of varieties to a certain environment, provided the *combination* of stock and scion is a proper one for the soil and climatic conditions. A combination successful under one set of conditions may be a total failure or nearly so when the conditions are changed.

For two or three decades it has been accepted as proven that the Satsuma is not suited to budding on the sour orange stock but *is* peculiarly adapted to working on the trifoliate orange. And recently, however, some satisfactory crops of Satsumas have been reported on sour orange in a certain section of this state. As a rule however in the Gulf Coast sections, Satsuma trees on the sour stock are discarded as soon as their condition is recognized, since they have generally proven unfruitful.

There are sections of this country, however, where the Satsuma might be a desirable crop, but where the trifoliate orange is poorly adapted for reasons not fully understood. The trifoliate orange is a deciduous tree, not closely related to true citrus and doubtless does best in sections having winters cold enough to allow its natural dormancy to be undisturbed. This may be a leading factor in its failure in the warmer parts of Florida.

There are however some of the soils in the southwestern region of the United States and in Texas where the winters are quite cool enough, yet the trifoliate orange does not thrive. It is believed that an excess of lime is a contributing factor to the poor growth of trifoliate stock in such situations.

In the lower Rio Grande Valley, neither the rough lemon nor the trifoliate orange can be used successfully, only the sour orange being suited to the silty soils,

carrying quite a high percentage of mineral salts.

In the course of citrus breeding work inaugurated about thirty years by Webber and Swingle of the U. S. Dept. of Agriculture, crosses were made between the trifoliate orange and the sweet orange, giving rise to a series of hybrids called citranges. The citrange has proven valuable as an ornamental in regions north of Florida and the fruit has served as a lemon substitute in regions too cold for any true citrus to be grown.

But recently it has been noted that this hybrid is adapted to some soils as a stock where neither parent could be successfully used. While not as hardy as the trifoliate orange, buds worked on the citrange are fully as hardy as on the older stock and the fruit has the same quality and season of maturity. In mentioning the citrange as a stock, I have no thought of suggesting its substitution on a commercial scale for the trifoliate stock where the latter is adapted, but it affords an instance of how by breeding, utilizing materials nature has given us, we may create new forms adapted to soils or situations where the commonly used stocks or varieties are unsatisfactory, or total failures.

In the case of the lower Rio Grande Valley, restricted to the sour stock, Satsuma growing is not at all promising, but with the citrange as a stock, it may prove worth while, at least in connection with other varieties.

The hot dry interior valleys of southern California and Arizona present peculiar problems in adapting a citrus stock to local needs. The citrange offers much promise for such situations, not only for the hardy Satsuma but for other varieties, imparting hardiness and early maturity to varieties worked on it.

Some of the wild forms of citrus introduced from the desert regions of Australia seem to indicate promise in such arid regions, but will probably need to be energized by crossing with other forms of citrus before possessing the requisite vigor for a successful stock. Several hybrids of this character have already been made and will be given a practical test during the next few years.

From the standpoint of hardiness and adaptability, the citrange has many good points, but when tested for resistance to the dread disease, Citrus canker, it was found to be about as susceptible to this disease as the trifoliate orange, which is highly susceptible.

Knowing that the kumquat was practically immune to this disease, Dr. Swingle crossed the citrange with the kumquat, giving rise to a new kind of citrus fruit, the citrangequat, more nearly resembling a lime than any of its three parents. It proved fully as hardy as the citrange, vigorous and thrifty and absolutely immune to canker. Whether this immunity to disease will ever become a factor of economic importance is of course a matter that need not concern us now but the creation of such a hybrid, combining a number of desirable characters, indicates the possibilities lying along plant breeding lines.

In considering these hybrids as possible rivals of the trifoliate orange as a Satsuma stock, one attribute they pos-

sess must be given consideration, an attribute that has been forcibly brought to mind by the freeze of the past winter in Northwest Florida and the Gulf Coast beyond. In the case of the trifoliate orange, if the budded top is killed by cold, the root usually dies without sending up a sprout. The hybrid stocks under the same circumstances would soon send out sprouts which could be rebudded and a grove could be rebuilt in a few years after a disastrous freeze.

With such obvious advantages, the question might well be asked, why are these new stocks not being taken up commercially? I may say that commercial interests *are* beginning to give them attention, but the fact that the fruit of the citrange and citrangequat produce very few seed is a factor that hinders their rapid propagation by present methods.

Seedlessness is a most desirable attribute for an edible citrus fruit but becomes a decided weakness when that fruit is considered from the standpoint of furnishing a citrus stock.

However, it has been found that these hybrids can be readily rooted from fine twig cuttings, but as this practice requires a change in the ordinary technique and the use of special equipment, it is not to be expected that they will be taken up rapidly—at least until, in practical tests, they have shown marked superiority over the stock or stocks used at present.

It may be well to state here that the rooting of such cuttings has been greatly simplified and cheapened by the adoption of a new form of propagation frame which utilizes sun-light as a source of bottom heat. This frame was first tested out last summer by the writer at Washington and gave practically 100 per cent results, with most of the citrus plants used in the test. The cuttings rooted by this method were stronger than those usually obtained by the use of greenhouse equipment (with steam coils, etc.) and the time required for rooting was not over 30 to 40 days. Usually in a month's time the cuttings were ready for transplanting.

This winter several of these solar rooting frames have been constructed in Florida for use on a small scale. Mr. J. H. Jeffries, Supt. of the Citrus Experiment Station at Lake Alfred has brought to the meeting a model showing how the frame is constructed.

A circular is now in press which will be issued by the U. S. Department of Agriculture, describing the equipment and rooting methods for citrus and discussing its future bearing on nursery practice.

You have already listened to facts from other speakers, which show the need for much greater uniformity in our citrus stocks. I am not prepared to recommend cutting propagation on a commercial scale as a means of securing this desirable uniformity, but there are many forms of investigational work where such stocks secured from cuttings might be used to advantage.

In deciduous nursery practice there are many instances where rooted cuttings are regularly used as stocks for budding in preference to seedlings. The deciding factor as between seedlings and cuttings is too often cheapness and abundance of supply of propagating material rather

than superiority of the final result. However before any definite recommendation for the use of citrus cuttings can be made, comparative tests now planned must be carried out.

All of the foregoing discussion may seem to have only slight interest and little bearing on the stock problems confronting the citrus grower of South Florida. The merits of different stocks has been much to the fore in the recent meetings of the Horticultural Society and it is a sign that we are not all satisfied with present conditions. The plant breeder concerns himself with eliminating obvious defects in cultivated plants, or in accentuating desirable characteristics already existing. Sometimes nature has given us plants that in their proper place and rightly handled seem supremely adapted. There is no need for some human hand to attempt to "paint the lily." Elimination of the unfit and selection of superior strains is about all that the breeder is called on to attempt.

But, if in our modern efforts to make food factories out of a semi-wild plant, we disregard the natural bent of the plant, disturb its balance and force it beyond its wont, we may bring to light weaknesses that are inherent not in the plant, but perhaps in the planter. It is time that we took stock of our methods of culture.

The pioneers in the citrus industry of Florida found the sour orange thriving in the hammocks, competing successfully with forest trees. Likewise on the sand hills the rough lemon held its own and naturally these two plants have become the foundation for the present day groves of Florida.

I am not going to discuss the respective merits of these stocks, nor the cultural methods suited to each—other speakers and committees will discuss these matters, but I am going to cite a single instance to illustrate my point that the plant is not always to blame.

Recently, I have visited two Valencia groves within a mile of each other, one on sour orange stock and the other on rough lemon. Both groves are in good physical condition. The grove on sour orange has been kept cultivated since early fall and by the first of April the fruit was beginning to dry out and had to be shipped to prevent rapid deterioration.

The grove on rough lemon has had no cultivation in six years—the weeds and grass simply being mowed and the fertilizer scattered on the sod. These oranges are still sound and in fact not yet fully mature. Not only is there no sign of drying out, but the fruit will not be ready to pick for at least a month yet, to judge by its present condition.

I know this state of affairs is just the reverse of the usual and expected performance on the two stocks and do not in citing this instance mean to infer that the methods used are applicable in all cases.

The production of quality fruit is one of the first requisites in the present citrus situation. There is a tendency to blame the variety or the stock in many instances, when perhaps there has not been adequate consideration given to methods of cultivation or to the soil itself.

Many thinking growers are giving this phase of the situation careful study and improvements may be confidently expected.

If in the course of this line of experimentation it should develop that we are planting to citrus, soil types that cannot, by reason of droughtiness or light character be so handled as to produce good quality of fruit, we should recognize that fact and seek better soils.

Meanwhile let us build up our soils rather than exploit them. The result, I believe, will be improved quality of fruit and longer lived groves without material sacrifice of quantity production.

Member: I would like to ask Mr. Robinson if he knows the difference in the fertilizer used in those two groves?

Mr. Robinson: I haven't all the details, but I know that in the case of the sour orange grove it has been given a low ammonia formula, which is supposed to produce quality fruit. It hasn't had over 2 per cent ammonia in a number of years. The other grove has been fertilized with pure chemicals, scattered on top of the ground.

Member: How about nitrate of soda for trees on sour stock?

Mr. Robinson: We find that where sulphate of ammonia is used on sour stock, the fruit will dry out. Where nitrate of soda is used it will not.

Member: How long did you say that the rough lemon had not been cultivated?

Mr. Robinson: Six years.

Member: What kind of soil?

Mr. Robinson: It's a better grade of pine land, particularly in both cases.

Member: High or low?

Mr. Robinson. It is rolling pine. It is not flat pine, and you might call it high flat pine.

Member: Have you any information concerning young trees without cultivation?

Mr. Robinson: I believe young trees will have to be cultivated. Mr. Reasoner's practice is to cultivate. To tree-rowing them the first three or four years, and not allowing them to fruit at all. This builds up a bearing surface during that period, after which they go on to the non-cultivation basis.

Mr. Coachman: What size of crop does this non-cultivated grove produce?

Mr. Robinson: It looked to me like a very good crop. I don't know what the records have been over a period of years, but I think Mr. Reasoner can give you some figures. The quality of fruit has been so satisfactory that I have heard of this grove and known of it for several years, and the crop that I saw was very good.

Mr. Skinner: The question is asked how high the water table is in Mr. Reasoner's grove.

Mr. Reasoner: I should say about 4 feet in the rainy season, and at a very much greater depth in the dry season. This is high pine land for Manatee County, and after heavy rains the water never stands in that grove.

Mr. Merrell: In that non-cultivated grove was the grass raked up or let lie?

Mr. Reasoner: It laid right there.

Mr. Merrell: Was any effort made to mulch the trees?

Mr. Reasoner: No.

Member: What is the cover crop?

Mr. Reasoner: It is ordinary grasses.

Member: No Bermuda grass or cowgrass?

Mr. Reasoner: No Bermuda as I know of. There is some of the cowgrass. I had a little experience this last Fall. I had such a heavy hay crop I didn't want to take it off, so I piled it around the trees. The trees had been badly hurt by the storm two years ago, but I allowed them to remain. I never obtained a better growth than that following this mulching. I consider cowgrass one of the greatest helps to grove culture on high land that has ever been introduced, if you leave it there and just mow it.

Mr. Skinner: Would you mind saying what form of fertilizer you use?

Mr. Reasoner: We used inorganic; have used soft phosphate and also non-acid phosphate; haven't used any bone or super phosphate. The ammonia was mostly nitrate of soda. I have been using more nitrofol than nitrate of soda.

Nitrofol is 15 per cent ammonia and 15 per cent potash.

Mr. Lehmann: Do I understand the method of handling the trees brings later fruit? Does it retard the growth materially?

Mr. Robinson: It enables the fruit to hold its juices, by not being forced into growth, is the way I interpret it. I want to make a remark about the Cleopatra. It came to my knowledge that a number of people interested in planting Cleopatra stock have been making the mistake of planting seeds of the Kumquat, Panama Orange, etc. These are beautiful ornamental fruits, but are not the Cleopatra. Others have planted seeds of some small tangerines, not Cleopatra. We should be careful to get the right seed.

Mr. Hart: I want to ask Mr. Robinson if he thinks this system of non-cultivation would be safe without irrigation?

Mr. Robinson: It would be absolutely all right, but I put in an inexpensive system of irrigation, and when we have a season of great drought I give one irrigation—in any year not more than two.

Mr. Skinner: I had a conversation yesterday with Mr. Stirling, who travels all over the State. I suppose he sees as many groves as any other man in the State, and he says he is absolutely sold upon non-cultivation, both for quality of fruit and quantity of good fruit received per acre. He almost refuses to make a public statement, on account of his official position, but if you have any time to talk with him, he has something to say which is very interesting and very valuable, and unquestionably we are getting too far away from the fine quality of fruit we used to grow in Florida. Our quality of fruit is deteriorating, especially is that true this year. We have got to get back to a better quality of fruit.

Mr. Reasoner: I don't mind saying that three years ago our Valencies on rough lemon averaged $6.00 a box on the tree; 2 years ago $5.50 and last year $3.59.

Mr. Skinner: Could you briefly outline Mr. Painter's experiments?

Mr. Reasoner: I don't recall enough detail about them, but his groves were very heavy croppers; they had very good fruit.

Mr. Skinner: He practiced non-cultivation?

Mr. Reasoner: He only mowed his grove.

Mr. J. C. Chase: You perhaps remember that the first President of the Horticultural Society brought up his groves by non-cultivation. He never cultivated his trees. They would go out in the woods and rake up oak leaves, etc., to mulch his trees, but didn't cultivate them. He fertilized; got good quality fruit; the trees were heavily fruited, of good quality and fine flavor.

Mr. Skinner: They were on rough lemon root.

Mr. Howe: I would like to ask if this would be practical where the grove wasn't irrigated, particularly, on higher land.

Mr. Reasoner: You are saving money, and in one season of non-cultivation you can put in an irrigation plant.

Mr. Howe: Do you think it practical where irrigation couldn't be done?

Mr. Reasoner: On good land?

Mr. Howe: Yes sir.

Mr. Reasoner: Absolutely.

Member: I note in the discussion of the Cleopatra stock no one has said anything about the susceptibility to foot-rot?

Mr. Skinner: It is immune. It is also immune to citrus canker.

Mr. Robinson: It is resistent, but not immune.

Production and Marketing of Florida Citrus Fruit

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The Florida citrus industry, in common with agriculture in all sections, has been obliged to face constantly increasing costs during the past few years without compensating increases in the price of the product. The Florida and California citrus growers have been able to defer the evil day somewhat longer than producers in other sections, but the time has come when it is essential to give close attention not only to better methods of production and marketing, but also to the costs of these operations.

There has been a tremendous increase in the production of citrus fruit during the past few years. The extent of this increase from a total of 74,845 cars in 1920 to 106,614 cars during the calendar year 1923 can hardly be appreciated from a recital of the figures. A diagram would show that it is an increase of over 40 per cent. Florida shipments during the calendar year 1923 have increased over 55 per cent above shipments during the calendar year 1920.

The increase in shipments of citrus fruit, large as it is, is not the entire story. There has been during this same period an enormous increase in the production and shipments of all kinds of fruits and vegetables. Shipments of lettuce, for example, have practically doubled since 1920. Shipments of apples were approximately 25 per cent larger during the calendar year 1923 than they were in 1920, 1921 or 1922, and apples, most citrus men agree, compete strongly with oranges and grapefruit.

Furthermore, the reports of the State Department of Agriculture show that in 1922 there were approximately half as many non-bearing grapefruit trees in Florida as were already in bearing. The same report also shows that there were actually more non-bearing orange trees in the State in 1922 than were already in bearing, the number of bearing trees being 4,779,507, and the number of non-

*Mr. Schoenfeld was introduced by his co-worker, Mr. Lloyd S. Tenny, Assistant Chief of the Bureau of Agricultural Economics of the United States Department of Agriculture. Mr. Tenny is well known in Florida having come to the state twenty years ago working under G. Harold Powell of the United States Department of Agriculture on the problem of the decay of fruit in transit.

Later, Mr. Tenny, as secretary of the Florida Growers and Shippers League and as a member of the Advisory Committee of the Board of Control of Institutions of Higher Learning, had an important part in organizing the work of citrus canker eradication in the state.

bearing trees being 4,819,135. In California, the number of non-bearing orange trees in 1920 was approximately 25 per cent of those in bearing, according to the census figures; the number of bearing orange trees being in round numbers 10,000,000 and non-bearing trees 2,500,000. The number of non-bearing lemon trees was approximately 30 per cent of the number of bearing trees.

The rapid increase in production, and the further increase indicated by the large number of non-bearing citrus trees in both California and Florida create a situation which merits the serious attention of this Society and the assistance of State and Federal agricultural agencies. My talk will be confined principally to a discussion of the costs which are assessed against the industry. When an industry is prosperous and prices are high, it is not easy to arouse much interest in a discussion of costs. After a season like the one that is now coming to an end, the importance of possible economies during the stages of production and marketing is brought to the foreground in the minds of the producers.

In my discussion of costs I do not intend to confine myself to what are commonly called "costs of production." Every charge assessed against citrus fruit between the grove and the consumer's table is a deduction from the consumer's dollar, and reduces the amount the producer receives. From this point of view, transportation charges and the margins of the wholesale and retail dealers are just as much costs of the grower as what he pays for fertilizer and labor.

It is necessary that these charges be studied and analyzed just as closely as costs of fertilizing, cultivating and spraying. They are relatively larger items than the costs incurred in producing the crop. A box of California oranges accumulates direct charges of approximately $2.80 between the orchard and the wholesale market. It costs approximately $2.20 to pick, grade, and pack a box of Florida oranges and deliver it to the wholesale receiver in New York City. This allows the grower nothing for his fruit or for the labor and expense he has been to in producing it. Before the fruit reaches the consumer's table terminal market charges must be added. These will be discussed later.

It is easy to see, therefore, that it brings the citrus grower no profit to save 10 cents a box in the cost of producing the fruit, if he loses 50 cents a box through wasteful methods in the terminal markets.

From 1917-1922 the Bureau of Agricultural Economics conducted studies of the cost of production and the net income from 100 fruit farms in Polk County. The cost of bringing an acre of citrus grove into bearing, as an average for those years, on the farms studied, was $524, including the cost of the land. Approximately one-half of this amount was in initial cost and the remainder maintenance costs. The net cost per acre of producing fruit on these 100 Polk County groves varied from $229 in 1917 to $357 in 1920, the average cost per acre over the six years being $311. Expressed on a per box basis it cost from $1.66 in 1919, to $2.36 in 1922, or an average over the six years of $2.03 per box for

oranges. Grapefruit, averaging a somewhat higher yield, added an average cost over the six years of $1.65 per box.

Fertilizer was the largest single item of direct cash cost, averaging $70.16 per acre over the period of the study. The next two items in order of their importance were hired labor, $45.11, and taxes and insurance $11.48 per acre.

Included in the costs of these 100 Polk County citrus groves, in addition to the usual cash items, were such non-cash costs as depreciation, operators labor which averaged $26.33 per acre, family labor, and interest on capital. Deductions totaling $8.74 per acre were made for receipts from other crops and for miscellaneous income from the groves. The average number of acres of bearing groves in these 100 farms was 18.2 acres, which I imagine is somewhat higher than the average for the State.

According to this study it cost the owners of these 100 groves $2.36 per packed box to produce oranges in 1922. We do not have similar studies covering the cost of packing and marketing oranges and grapefruit in Florida, but I note that one of the district marketing organizations in the State recently stated that the cost of packing, advertising and marketing the 1923-24 crop was 87 cents per box for oranges and 89 cents per box for grapefruit. Picking and hauling charges must be added to this and if costs are at all comparable with those in California I should judge that 20 cents per packed box would not be an excessive amount for both items. Therefore, to the production cost of $2.36 per box there must be added approximately $1.07 per box to cover picking, hauling, packing and marketing. Transportation charges from Orlando, Fla., to New York City are 87 cents per packed box, at the present time, and refrigeration costs, provided refrigeration is used, are a little more than 19 cents per box additional. A box of Florida oranges shipped without refrigeration, therefore, must sell for roughly $4.50 in New York City to pay the direct charges which have accumulated, and return the grower the cost of production, as determined for the 1922 Polk County figures.

As I have said, no studies have been made by the Bureau of Agricultural Economics of the cost of packing and marketing Florida citrus fruit. An analysis has recently been made of the expense connected with the marketing of California oranges and lemons through co-operative organizations. The items of expense under California conditions may not be entirely comparable to those in Florida, but the study shows, at least, the possibility of analysing such expense and effecting savings at certain points. The average packing house expense for oranges for the years 1917-1921, inclusive, was found to be a little less than 55 cents per box, as an average for the associations studied. The costs for 1921 was approximately 75 cents per box. To this must be added an average expense of 1 cent per box for the district exchanges, 4.1 cents per box for selling and 3.7 cents per box for advertising, or a total in round numbers of 86 cents per box, which is very close to the figure of 87 cents per box given by the Florida citrus organization I have mentioned. The

California figures, however, are for the year 1921, while the Florida figure is for the present season. Picking and hauling expense averaged approximately 20 cents per packed box for California oranges in 1921.

Averages, however, tell us little regarding the efficiency of the various organizations which make up the group. In analysing the expense of the California associations it was found that packing material was the largest item, with direct labor second and indirect expense the smallest item. Variations in the expense of packing house material were as much as 7 cents per box between a group of eleven comparable orange associations whose expenses were averaged for the three-year period 1919-1921. A part of this difference was due to the purchase of material of varying quality, but at least a portion of it was caused by wastage of such material as box shook and paper wraps, and deterioration of material stored from one season to the next.

However, the most important variations were discovered in labor expense. The analysis developed the interesting fact that labor economy was not necessarily correlated with volume of business. One association, for example, showed an average labor expense of a little less than 10 cents per box for the three-year period. On the other hand it cost four associations handling a greater volume of business 14 cents per box for labor, as an average for the same period, or 4 cents per box more. This may seem like a small item but, as a matter of fact, one association among the four mentioned, if it could have reduced its labor cost to the same amount as the association operating for 10 cents per box, would have returned to its members over $15,500 additional each year. The four associations mentioned would have made a total annual saving of over $50,000 provided they could have reduced their labor costs to the same level as the association operating at an expense of 10 cents per box for labor.

Low labor cost, of course, may be secured at the expense of real efficiency, as it is reflected by net returns received by members of the association. At the same time there was every indication in the California study, and I think the same will hold true in Florida, that low labor costs are secured, as a general rule, by efficient management, and only in exceptional cases as the expense of careful handling, grading and packing of the fruit.

Labor and material in the California organization studied were found to make up, as an average, 78 per cent of the total packing house expense. In spite of the fact that indirect expense was a relatively small item, however, there was variations in indirect expense between different associations which had an important bearing on the net returns to growers. For example, in 1921, we find one organization operating with a total indirect expense of 6½ cents per box. Another association handling approximately the same volume of business incurred overhead expense amounting to a little over 13 cents per box, or double the amount per box expended by the first organization. In absolute figures this means that the members of the second association

were charged over $14,000 more than the members of the first association for this one item of overhead expense.

There are, of course, many factors of expense beyond the control of the management. The California study was not undertaken primarily as a cost study, and the data which I have quoted are a little more than an indication of the opportunities for further analysis of the possibilities in packing house operations. It is evident that taking all factors into consideration there are a number of associations and other packing organizations that without disregarding in any way the proper handling of the first operate considerably economically than others. An industry which is concerned with a large increase in supplies and high operating costs must take into consideration all opportunities to reduce expense.

As I have stated, Florida oranges must sell in New York City at approximately $4.50 per box in order to pay accrued charges for handling and marketing and return to grower cost of production. Before these same oranges reach the consumer additional expense must be incurred. Data collected over a period of years by the California Fruit Growers Exchange show, as an average, that during the 5-year period 1917-1921, inclusive, the retailer obtained as a margin $1.88 per box for oranges. The wholesaler received 61 cents per box; transportation agencies $1.22; and packing and selling charges absorbed 64 cents. Expressed in another way, the grower received, as an average figure, $2.78 per box for oranges during this period; the value with packing and selling charges added was $3.42; transportation charges brought the per box cost up to $4.64; the wholesaler's margin increased it to $5.25; and the consumer paid $7.13 per box for this fruit. In other words, the retailer during this period, received an average margin equal to 67.7 per cent of the grower's net receipts for each box of oranges he handled. In 1921, the retailer received as an average margin $2.17 per box, while the average net return to the growers was 12 cents per box less, or $2.05. As an average for the 5-year period, more than half the total expense to the consumer was absorbed by transportation charges and wholesaling and retailing agencies in the terminal markets. It is unnecessary to emphasize the fact that the grower has a greater interest in the costs which accrue after the fruit leaves his orchard than he has in his production expense.

The Bureau of Agricultural Economics, in co-operation with the Port of New York authority, has been studying the terminal handling of fruits and vegetables in New York City. Florida's stake in the New York market is a considerable one. About 8 per cent of the 145,000 cars of fruits and vegetables consumed in the Metropolitan district in 1921 originated in the State of Florida. Conversely about one-quarter of all Florida shipments went to New York City. Eighteen per cent of the citrus fruit shipped from the State, according to this study, went to New York. During the year 1923, 32 per cent of the retail price paid by the New York consumer for Florida oranges was absorbed by city marketing agencies. This agrees very

closely with the California figures quoted for the period 1917—1921, representing data collected in approximately 40 markets. As an average for the 5-years, 35 per cent of the price paid by consumers for California oranges in these markets were absorbed by city marketing agencies.

In the face of these large city margins there is a temptation to shout "profiteering" as an easy explanation. However, large gross margins do not necessarily mean large profits; what they do point out is need for improvement in the system of distribution. By far the largest portion of the city margin goes to the retailer, and yet the retailer is not noted for his profits. Competition is keen, volume of trade small, and unit costs are high in the retail trade. The usual grocery store handles one package of a perishable product at a time. Fruit and vegetable markets trade in a somewhat larger volume and push-cart men and hucksters frequently handle five or six boxes or crates of one variety in a day. With the ordinary retailer catering to four or five hundred families, all desiring wide variety of selection and small units of purchase, the cost of handling a single unit is large. Staple groceries are sold at much smaller margins—bread at 15 per cent, sugar at 10 per cent, butter at 8 per cent.

The loss through shrinkage and deterioration in perishables is another large item. One important chain store allows a shrinkage of 10 per cent on barrelled apples, cabbage and sweet potatoes; 3 per cent on white potatoes, 6 per cent on onions, and 16 per cent on Boston lettuce, in charging retail branches with goods, as well as calculating an overhead loss of 15 per cent additional depreciation. Nevertheless, the field of retailing offers great opportunity for improvement in organization and method. Organized producers of perishable products can accomplish a great deal in demonstrating better methods of retailing and in encouraging the quicker turnover, at a lower gross margin, of the products which they produce and sell.

The work of the dealers' service branch of the advertising department of the California Fruit Growers Exchange is an example of what it is possible to accomplish in this direction. Some startling results have been reported of increases in retail sales brought about by demonstrations of the advantages of attractive display and small margins. The retailing problem is one that requires careful study by investigational agencies. However, the producers of perishable products themselves must give consideration to the problems of the retailer in so far as they are related to the products they produce.

In New York City, however, terminal handling is an item of expense of more immediate concern than retailing because of the greater concentration of volume, the high fixed costs of movement, and the really serious problem of congestion.

Terminal handling in New York involves railroad yard switching, floating, and pier-station delivery; sorting, stacking, assembling, loading on the piers; trucking to outlaying jobbing markets, reassembling, repacking, and delivery to the retail store. To this service may be charged from 15—20 per cent of the con-

sumer's dollar for most commodities. Just how much these costs can be reduced is not easy to calculate. Studies of railroad traffic and cost show that unified terminals would result in savings of pier rentals and in smoothing out the traffic flow, and that properly designed market display, sale and assembling platforms would eliminate some expensive truck movement and faciliate handling.

A careful analysis of produce trucking operations shows that over 40 cents of the trucking dollar is lost in maintenance of idle equipment and in delay at terminals and stores. At present it costs 12½ cents to load a barrel of Florida potatoes from the pier platform to a horse truck and move it out to the tail-board of a motor truck waiting in the street. Lettuce and cabbage hampers pay 6 cents for the same per head delivery.

Another consideration, important to the grower, is that perishable products shall arrive at a time when wanted, and, it might be added, in such condition unit of quantity and type of package as is most desired. Too little attention has been paid to the consumer by the shippers of perishables. Naturally, it is harder to regulate the purchasing of an extremely perishable raw food than a manufactured one. However, serious losses to shippers, dealers and railroads alike might be prevented by more intensive study of the consuming markets.

Day-to-day demand is a factor along with supply in determining the prices in the terminal markets. For example, it has been found that demand for lettuce during the winter season, December to April, is affected largely by temperature, and to some extent, by consumers' habits of buying throughout the week and before and after holidays. Preliminary studies show that an increase of one car in the supply results in a decline of 1 per cent in price, other things being equal, and that a rise in average temperature of 1 degree results in a rise of 6 cents per hamper in price, other things being equal. If these conclusions are verified by further inquiry and can be combined and modified into workable tools of prediction, it will be possible to regulate shipments by diversion and reconsignment on the basis of advance calculations, so that the alternate over-and-under supply can be eliminated, and marketing hazards and costs reduced.

We are some distance afield from a consideration of the cost of fertilizing, cultivating and spraying citrus groves. But the costs which we have been discussing are just as truly cost of production to the citrus grower as those under his immediate control. It is just as necessary for him and his organizations that these costs should be studied and analysed in order that unnecessary services, duplication of services, and unnecessary charges may be eliminated.

The efficient producer will in the future study more and more closely the question of costs that affect his product. He will study this subject not only from the point of view of reducing operating expense, whether in production or marketing, but also from the standpoint of receiving the highest net return for his fruit.

Undoubtedly more attention will be given to the standardization of varieties,

the elimination of a great number of varieties which are at present produced, and concentration on those which are found to be best adapted to Florida conditions and most in demand in the markets. California, as you know, has arrived at this condition some years ago, and at present shipments from that State are mainly made up of Washington Navel and Valencia oranges. It will probably not be possible for Florida to concentrate on two varieties but I believe marketing conditions would be improved if possibly only three or four were shipped from the State in any volume.

At the same time the careful grower will give close attention to the quality of fruit which he produces and special attention to the spraying which is necessary to grow fruit free from insect and fungous disease. The Bureau of Entomology for many years has been demonstrating in Florida the results that can be accomplished through the careful and thorough spraying. Some of the Bureau's demonstrations, as I recall them, have shown that it is possible to raise the crop of an orchard a complete grade by proper spraying for white fly, rust mite, citrus scab, and the various other insect and fungous troubles that afflict the citrus grower.

A careful grower, as I have said, will carry on these operations to raise the grade of his fruit because he will come to realize, if he does not already realize, that under present conditions low-grade fruit, as a rule, will not return the cost of production. In other words, your No. 1 grade in many cases, must pay a portion of the packing, marketing and transportation charges incurred by the No. 3 grade.

From the same point of view, the grower will also take an added interest in the standardization of the grades under which his fruit is shipped. It is unnecessary here to discuss in detail the advantages of standardization which, no doubt, all of you appreciate. There are certain classes of oranges and grapefruit that cannot be marketed profitably under present conditions. Standardized grades make it possible to determine where the line must be drawn.

We are forced to the conclusion that if production increases at the present rate in both Florida and California there will be a great increase in the quantity of citrus fruit that it will not be profitable to ship. Some provision should be made for the disposal of this low-grade fruit. Perhaps in time, like the packers, your profits will come from the sale of by-products made from the waste material of the industry, while the first grade fruit will carry the expense of production and marketing. I understand that grapefruit is being canned in the State with considerable success. Our representative in England advises that there are enormous possibilities for the sale of canned grapefruit in England, and in the Continental markets.

Some attention has been given to the manufacture of marmalade and similar products from cull oranges and grapefruit. I am not advised as to the success with which these ventures have met in Florida, but the California co-operative organization has given up the manufacture of marmalade, finding it an unprofitable method of disposing of their cull

oranges. One difficulty in California was that only 15 per cent to 20 per cent of the value of the finished product was derived from the oranges, the remainder was made up of glass, sugar, and labels; in other words, it was necessary to spend $80 to $85 to salvage $15 to $20 worth of oranges. After one or two failures the Exchange Orange Products Company, of San Dimas, Calif., a by-products company, affiliated with the California Fruit Growers Exchange, seems to be now on a basis that promises to offer a fairly profitable outlet for cull fruit.

The success of the enterprise in California depends first upon the ability of the company to work out the various processes that are still in the experimental stage, and secondly, upon its ability to manufacture by-products at a cost that will enable it to place a reasonable value on the culled oranges which it receives from the packing houses.

The Exchange Lemon Products Company has operated in California since 1915 and has, on the whole, been more successful than the orange products company. The Exchange Lemon Products Company has returned to the associations, for cull lemons, more than double the amount invested by these associations in the stock of the company.

I have said nothing about organization, the consolidated distribution and sale of shipments, and many other questions which are alive in Florida at the present time. I have simply attempted to show you something of the nature of the costs which the citrus industry of Florida must pay, the factors entering into these costs, and the necessity of carefully studying and analysing these factors.

It has occurred to me, however, as I have reviewed the situation, and possibly it has also occurred to you, that the individual grower or the average individual shipper is comparatively helpless in so far as his marketing costs are concerned. The problems involved are complex and require the co-operation of all agencies. This may or may not mean co-operative marketing, as we generally understand it, but at least it does mean some sort of concerted action between the producers of citrus fruit, their co-operative agencies, and other agencies engaged in the handling and marketing of the product. The Bureau of Agricultural Economics has carried on studies of the costs of producing and marketing citrus fruit, and at the present time is actively engaged in studies of terminal market costs and problems. This work is being done in the interests of the producers of oranges and grapefruit and can be made more effective and far-reaching through your active interest and support.

By Mr. Schoenfeld (following his paper:) I am going to venture a suggestion and thought which may not be entirely unsound. I have been thinking over how you can use these cull oranges. There is something wrong, some place, when these perfectly good fruit can't be utilized. I understand there has been some discussion as to shipping the extracted juice into the Northern States. I am not prepared to discuss that intelligently, but here's a thought that occurs to me. I think it may offer some pos-

sibility of relieving this volume of cull oranges.

As I know something of the handling of raw milk in cities through the large distributing agencies, as Sheffield Farms in New York, Wise Bros., in Washington, etc., it seems to me that they may have an organization that would lend itself as an outlet to orange juice. It may seem odd that you tie up milk distribution with orange juice, but I recall that my own child was brought back on his feet by the judicious feeding of milk and orange juice. I know that in hospitals they are constantly urging orange juice and milk drinks as a part of the diet. I know that it's a growing knowledge that orange juice should be used in the daily menu, so as to give the vitamines. Wouldn't it be entirely feasible if cull oranges were loaded into box cars this time of year, and in refrigerator cars in the winter time, and sent to milk concerns, where they could extract the juice from the oranges, by the juice extracting machines, running it through machines similar to their clarifiers for milk, which would extract some of the pulp and material, bottle it up in the regular way and distribute it through their milk distributing system.

I have every reason to believe that some arrangements like that could be worked out with some of the more aggressive milk distributors in the Northern States. If that could be sold for 12c to 15c a pint. I believe that ultimately your cull piles would begin to pay some profit. I am just offering this as a remark. I would like to see something done to work out this solution of reducing the cull pile.

Freight Rates

J. Curtis Robinson, Secretary-Manager, Growers & Shippers League of Florida, Orlando, Fla.

During the early developing period of our great fruit and vegetable industry of this State we have had serious growing pains in the way of fluctuation in freight rates which have pinched and restricted distribution and retarded the ulimited free and easy flow of our increasing annual crops of perishables to the consuming markets of the East, North and West. During that time the quantity produced and number of carloads shipped daily from any producing district was not extensive. It became a habit to gather the fruit from station to station and consolidate it in train load lots at Jacksonville and other northern gate-ways. As a consequence there was built up a peculiar rate structure for the fruit and vegetable industry of this State unlike the rates under which most other States accomplish the distribution of their perishables.

Florida therefore seems to be unfortunately situated from a transportation standpoint by having its rates made up of what are approximately a combination of locals. By that I mean, the transportation companies assess a rate only slightly less than the local rate from producing points to northern gate-way points, like Jacksonville, to which is added the rate from Jacksonville to make the through rate to various destinations. Practically all other large producing districts shipping perishables throughout the United States are favored with through rates from points of origin to ultimate destination.

The pioneers of our industry have on several occasions presented facts and figures to our Railroad Commission of this State and to the Interstate Commerce Commission as to the proper rates to be applied on shipments of citrus fruits and vegetables from Florida producing points to various consuming centers. Some readjustments have been made but the rates have been materially increased since 1908.

The rates have fluctuated up and down over a period of 27 years from 1895 to 1922.

The rates on citrus fruits were established by the Interstate Commerce Commission to eastern destinations in 1908, since which time the net increase in rates from Jacksonville to eastern destinations amounts to from 35 per cent to 50 per cent, while increases to certain other destinations is as high as 70 per cent.

On June 25, 1918, the Director General of Railroads promulgated an order in-

creasing the rates on Florida commodities generally 25 per cent. Some commodities were excepted, their rates being increased in cents per 100 pounds or per car. Fruits and vegetables from Florida were increased at that time 25 per cent.

A subsequent increase was made in 1920. This increase amounted to 25 per cent when destined to points in southeastern territory or 33 1-3 per cent when to points north of the Ohio and Potomac Rivers. Those rates which had been increased by 25 per cent and 33 1-3 per cent on top of the 25 per cent were on July 1st, 1922, reduced only 10 per cent.

When the Commission established our rates for citrus fruit in 1908, the average load per car from Jacksonville to points in the East was 253 boxes. The Commission established a minimum of 300 boxes. Today the average load is 360 boxes. The shippers have increased their loading efficiency 67.4 per cent per car. We save the use of one car in every five cars we load.

Every time we ship a car of 360 boxes of oranges to New York, the carrier is only hauling 20 per cent. more weight than the minimum carload established in 1908, while we pay 67.7 per cent more revenue than we paid on the minimum load in 1908 on what was considered at that time the average haul from Arcadia to New York.

If we estimated this seasons crop at 20,0000,000 boxes, it would take 66,666 cars of 300 boxes each to move it. By loading 360 boxes to the car the crop could be moved with 55,555 cars; in other words, by voluntarily loading the cars heavier we save the carriers a northbound and southbound haul on the tare weight of over 11,000 cars which we do not use but which we would use if we only loaded to the minimum. In addition to that, of course, we save them the interest on the investment on the additional number of cars which would be required, and many other items of expense to them is saved by the shippers heavier loading. Estimating 50 cars to the train, we are saving them, in one season, the haul of 228 trains each way north and south. If we figured the saving to them on the same basis as the cost to us for transporting our product to New York, it would mean that we save the carriers approximately $123.00 per car, $6,150.00 per train of 50 cars, or $1,402,200 in a season.

The perishable industry in our State has increased by leaps and bounds. When our rate on citrus fruit was established in 1908, the figures shown for the movement in the season of 1907-8 was 3,250,000 boxes. The crop of citrus fruit this year is more than six times what it was in the season of 1907-8.

The growers and shippers are laboring under the transportation costs established by war time conditions, while the returns for their products, particularly on citrus, has been sub-normal. The present transportation costs for shipping perishables from the State are a burden out of proportion to the service rendered.

Florida is seriously curtailed in its distributive operations. If a car of Florida oranges is diverted from one city to another seeking its best market, an additional transportation charge is imposed while our largest competitor, the State

of California, may offer their oranges to any market, Denver and east to Buffalo and Pittsburgh, at the same transportation cost per box to every market.

A few illustrations will serve to show you the handicap under which the distributor of Florida citrus fruits must work. The charge for transportation of a box of California oranges 2,800 miles is only 11 cents more than on a box of oranges or grapefruit from Florida for a distance of 1,400 miles. It costs only 10 cents a box more to haul a box of California oranges over 3,300 miles than to haul a box of Florida oranges or grapefruit 1,600 miles. Florida pays 8 cents a box more to ship a box of oranges or grapefruit 1,600 miles than California does for hauling a box 1,900 miles. Florida pays $1.10 per box more for a haul of 2,000 miles to Denver than California pays to Denver for a distance of 1,400 miles. California's average haul on oranges is about 2,550 miles, while Florida's average haul is from 1,200 to 1,300 miles, and yet California only pays 11 cents per box more to destinations like Chicago, Detroit and Buffalo than we have to pay from Florida.

Our rates to Kansas City are two cents per box higher than from California and to Omaha, St. Paul, and similar Missouri River points, our rates are 8 cents per box higher than from California. Out rates on grapefruit to other western Pacific Coast and Western Canadian territory are so high they prevent development of those markets for our products.

Some time ago I figured the location of the population of the United States, just to see what our distribution of citrus fruits was compared to the percentage of population in the various districts. I divided the country into three territories. In that district, Buffalo and East where 37.6 per cent of the population of the United States reside, we had distributed 52.6 per cent of our products. In that territory west of Buffalo, Pittsburgh district, north of the Ohio, and west of the Mississippi, which contains 50.3 per cent of the population, we had only distributed 30.3 per cent of our citrus fruit. In the territory representing the southern States, south of the Ohio, east of the Mississippi and south of Richmond, where 12½ per cent of the population reside, we had distributed 17.1 per cent of our product.

All of these and many other facts were presented by the Executive Committee of the Growers and Shippers League to the executives representing the carriers used as initial lines in Florida at a confercrence in Jacksonville on February 12th. We asked the carriers for an immediate emergency reduction in our rate of 40 per cent. This they were unwilling to consider. They did, however, take under consideration the possibility of an emergency reduction of 25 per cent, but after conferring with their connections notified us two or three weeks thereafter that they could give us no reduction in rates at that time. We have, therefore, concluded to present our case once more before the Interstate Commerce Commission with all of the evidence which we can assemble in support of our position.

We feel that the future development and prosperity of the industry depends upon a material reduction in the present

rates, and a readjustment of the present rate structure which will enable a more elastic distribution of our perishables, and we feel that every interest in the State which even partially depends upon the fruit and vegetable industry for its prosperity should be vitally interested in this with us.

In closing I may say that statistics show that the carriers in the southern district, earned, during last year, 5.84 per cent on the valuation of their property as established by the Interstate Commerce Commission, while under the Transportation Act of 1920 5¾ per cent was considered fair and reasonable.

During February, 1924, the carriers in the southern district had a net operating income which was at the annual rate of return of 7.56 per cent. Freight traffic on the southern roads during the month increased more than 8 per cent over the same month last year.

The fruit and vegetable industry of Florida is, according to the statistics of the Railroad Commission, State of Florida, 1923 report, only exceeded by two other industries, the products of mines and the products of forests. If the fruit and vegetable industry is going to prosper and succeed, it must, in my opinion, have an unlimited outlet where it may distribute its products unfettered by rates which impose a penalty upon the industry and which restrict its area of distribution to a limited territory beyond which it may not distribute at a profit. These are questions in which each and every one of you are vitally interested.

The western carriers serving California have demonstrated on various occasions their appreciation of what the earnings on the citrus fruit of California means in the support of their transportation lines, and have loyally fostered that leading industry until it is now well established. They have supported its needs for a wide distributive territory on a blanket rate making it possible to sell at practically one cost per box to most of the leading markets of our country. The carriers serving Florida and their connections have not given our industry such support and unfortunately do not apparently see the necessity for fostering and developing a similar tremendous industry located even nearer the market than California.

The Growers and Shippers League is preparing to file a complaint with the Interstate Commerce Commission to present our situation before them again with the hope and expectation that material relief will be promptly granted. We need and expect to receive the unstinted support of every grower, shipper, banker, merchant and every one vitally interested in the development and prosperity of the perishable industry of our State.

Mr. Skinner: I might add a word. The Growers and Shippers League are going to put up a good fight this time, and endeavor to get you lower rates, and save you probably around two million dollars, but they have got to have money to carry the work on. I hope every man who has oranges will realize that one cent contributed to this will give him many, many times this return, if we succeed.

An Analysis of Grove Costs

S. F. Poole, Lake Alfred

The writer has often been asked "What does it cost to care for a grove the first year, the second year and so on." The accompanying chart has been prepared, to show not only the yearly costs from the first to the twelfth years inclusive, but to separate these costs so as to show the comparative costs of the four major items of a year's operations.

These figures are taken from our cost sheets and are representative of 800 acres of citrus groves growing on the high pine lands of the Lake Alfred section. Further, these figures are based on the operations in these groves during the year 1923. Only the cost of growing the trees and fruit is shown. The cost incident to the marketing of the fruit has been excluded from the province of this paper, as this subject will be taken up by other speakers on this program.

Strange as it may seem, the cost of developing a grove does not show a regular rate of increase. As a matter of fact, the costs for the fourth year show a decrease over those of the third year. This is due to the item of cultivation, the younger grove requiring more labor to subdue the grass and weeds.

The speaker does not present these figures with any thought that they are less than those of any other concern. It is interesting as well as helpful to compare costs, for one may be shown where and how they may be reduced. I shall be very glad if any of you would furnish us with your grove costs so that the comparison may be as extensive as possible. Again, these facts indicate how much capital a person should have in order to develop a grove, a fact that is quite pertinent in these days.

The four items of grove work which we have selected are as follows: Fertilizers, Spraying, Cultivation and Miscellaneous. Under the head of Fertilizers is included only the cost of the materials. Spraying includes the cost of materials as well as the labor of applying. Cultivation includes harrowing, plowing, hoeing, applying fertilizers and sprouting (this latter work is done along with the hoeing.)

The Miscellaneous column includes supervision, pruning (when done) and fence repairs.

I will read each item by years first and then the total cost per year per acre. All the figures submitted have been reduced to an acre basis.

GROVE COST CHART (PER ACRE)

Year	Fertilizer	Spraying	Cultivation	Miscellaneous	Total Per Acre
First	3.73		22.31	4.28	30.32
Second	6.70	.78	27.88	4.40	39.76
Third	17.03	2.78	30.24	5.00	55.05
Fourth	17.09	4.68	24.77	3.19	49.73
Fifth	22.26	8.79	26.01	3.18	60.24
Sixth	26.05	8.93	20.12	4.00	59.10
Seventh	33.66	14.55	24.37	5.05	77.63
Eighth	34.87	16.34	17.45	12.44	81.10
Ninth	44.28	16.53	14.75	13.77	89.33
Tenth	49.94	21.37	17.38	25.58	114.27
Eleventh	58.52	31.83	24.78	47.89	163.02
Twelfth	71.25	37.00	17.67	51.68	177.60
Total	385.38	163.58	267.73	180.46	997.15

Member: How many trees to the acre?

Mr. Poole: We average about seventy trees to the acre—25 feet each way.

The Maturity of Citrus Fruits

Wm. J. Krome, Homestead

When a child attending Sunday School I used to puzzle about the story of the expulsion of Adam and Eve from the Garden of Eden. It didn't seem to me that our early ancestors got quite a square deal in that matter. For what purpose was that luscious apple placed upon the tree? Surely not just in order to tempt those early horticulturists. Then why put a ban upon its use and drive Adam and Eve from the Garden for yielding to what seemed to me a very natural and proper inclination. The whole matter worried me. Since I began growing and marketing oranges and grapefruit I have changed the opinion which I had formed as to any injustice in that transaction.

If the early translators of the scriptures had carefully followed their text we would probably have been informed that the apple (or possibly it may have been an orange) was not ripe and the Creator of all good things knew that it was not fit to eat and had wisely forbidden its use until such a time as it had reached the perfection which He intended it should ultimately have. In other words, Adam and Eve were expelled from the Garden for violating the first Immature Fruit Law and I am wasting no further sympathy on them.

It will be thirteen years next fall since I attended the first meeting in our section of the country, called for the purpose of discussing the maturity of citrus fruits. I remember how hard some of us worked to prevent that meeting adopting a resolution which favored the color test as an evidence of maturity. From that time to this date I do not think there has been a year in which I have not attended from one to a half dozen meetings in various parts of the State, called for the self-same purpose of debating the "whys and wherefores" of this old subject of citrus maturity. Some of these meetings have been most orderly and dignified discussions of the problem and some of them have partaken of the nature of a Kilkenny Fair, but I fail to remember one which adjourned without going on record with a unanimous vote condemning the shipment of immature citrus fruit. The trouble has always arisen when it came time to define that word "immature," and in the meantime, year after year, someone, not you nor I, of course, but some other wholly unregenerate descendant of Adam and Eve, has gone right along each season shipping great quantities of grapefruit and oranges, which the poor, benighted consumers, in total ignorance of what really constitutes maturity of citrus fruit, have pronounced unripe and wholly unfit for human consumption.

I want to say right here that personally I have been first, last and all the time an advocate of the so-called acid test as the standard by which the legal maturity of citrus fruits should be determined, and it has always seemed to me that the ratios of 7 to 1 for grapefruit and 8 to 1 for oranges are just about as near as we are likely to come to the proper figures. Furthermore, I will state that I have never knowingly shipped one box of citrus fruit which did not meet the legal requirements. Yet I know men who have had as many or more years experience in growing and marketing citrus than I have had, whom I believe are just as careful and conscientious in such matters as I am, who have built up reputations and demand for the fruit packed under their brands, who, with absolute sincerity, oppose the standards determined by acid tests and claim that color is the one and only evidence of citrus maturity.

As a matter of fact, I feel quite sure that neither color nor acid-test ratio will correctly determine the retail maturity of an orange or a grapefruit. I have given the matter considerable study along various lines and believe that the accusation of snap-judgment cannot fairly be lodged against the conclusions at which I have arrived.

For several years I worked upon the problem of altering the sugar or acid contents of citrus fruit by means of various sprays. It was an interesting problem and in the course of my investigations I followed out many clews which promised to lead to information as to the results of experiments or observations made by others along these same lines. Quite a few of the members of this Society may remember having had letters of inquiry from me on the subject. Suffice it to say that while many of my tests gave negative results, I did secure sufficient evidence to convince me that the acid content of citrus fruit, certainly, and the sugar content, possibly, may be to some extent controlled by spraying. For the past two seasons, press of other work has prevented my carrying these tests further, but I expect to resume them at the first opportunity and hope that at some later date I may be able to present to this Society some data which will be of interest, even though not of much practical value.

In the course of these experiments, I found, too, that I could appreciably influence the acidity of my fruit by the use of certain fertilizer materials. And likewise I proved to my own satisfaction the fact, with which most of you are already familiar, that the color of citrus fruit can be quite readily altered by spraying. I may add also that some of the trees upon which these tests were made will probably never again look as they did before the experiments were begun. It was very nearly another case where "the operation was a perfect success, but the patient died."

But while I feel quite sure that both the color and the acid ratio of citrus fruit may be to some extent controlled by the various methods which I have tried. I am equally certain that none of these have had any effect towards accelerating or retarding the real maturity of the fruit. That condition is brought about

by processes which it has not yet been given to us to fathom.

Every year since the acid ratio test first became incorporated in the regulations which have sought to fix the standards for the maturity of citrus fruits. I have conducted my own tests and have made literally hundreds, mainly upon grapefruit. I have sought not only to determine the acid ratio of the fruit under test, but to learn what bearing these figures had upon the condition of that fruit. The variety, size, color of peel, color of pulp, condition of pulp, the condition of the seeds, the juciness and particularly the *edibility* of the fruit have been noted. I believe that, as a result of close observation of these many, many tests, I am safe in saying that, after having carried on this kind of work for a week or two at the beginning of a season. I can estimate the ratio which a given fruit is going to show within two-tenths of one per cent before using the chemicals in any way. And the mass of figures which I have assembled simply confirms my belief that this test does not indicate actual or even comparative maturity.

As to color, I can only say that when an orange or a grapefruit has taken on that last shade of yellow which nature intended it to have, I am willing to venture a guess that it is pretty nearly fit to eat, but as long as it shows a tinge of green, or yellow-green or green-yellow, I will have to have some other evidence than my sense of color to guide me.

The question may be fairly asked as to why I advocate the acid-ratio test, and particularly the ratios as now adopted, as determining the standards which our citrus fruit must meet before it may be shipped, when all the evidence I have been able to secure leads me to think that this test does not necessarily determine the comparative maturity of the fruit.

I have two reasons for my advocacy of this standard. In the first place, while the acid ratio does not indicate the *maturity* of the fruit, it is the best index that I know of as to the *edibility* of the fruit. Not always a perfect guide I will admit, but more nearly reliable than any other which has been devised. In the second place it is a *positive* standard, not one depending upon the color sense or the conscience of the shipper or the friends he may assemble as witnesses, but a matter of cold figures which may be, and always should be, carefully checked as to accuracy.

I have told you that every meeting of citrus growers which I ever attended, that had half a chance for going on record in the matter, unanimously voiced itself as being opposed to the shipment of immature fruit. I have no doubt that this assemblage would do the same. Then if we are all agreed that the practice of shipping immature fruit is morally wrong and far worse, is darned poor business, we must necessarily admit that to put a stop to it there must be some standard established which is workable and enforceable. If in the acid-ratio test we have a means of determination that is comparatively simple, reasonably accurate and a fair indication as to edibility and if no better method has been devised, why not get behind that test and do our

best to see that we get a law which will make its enforcement possible?

As to the ratios of 7 to 1 for grapefruit and 8 to 1 for oranges. I can say that after years of sampling I do not care to eat fruit, nor offer it to others, if it runs below these ratios. On the other hand, fruit which will test close to these figures I have pretty generally found will likewise pass the test of my own palate and of those who consume the fruit I raise. A 7 to 1 grapefruit in October has not the luscious qualities of a 12 to 1 fruit in February. That we all know. Yet I think that it is distinctly edible and likely to be a whole lot more palatable and healthful than the same fruit the following May after the seeds have begun to sprout.

If we had only a million or two boxes of grapefruit and oranges to market we might consider the advisability of pushing up those standard ratios a notch or two, but confronted with an output of citrus fruit such as this State now produces, it is absolutely essential that the season for marketing shall be stretched just as far at each end as may be legitimate. We know the penalty which citrus growers have paid through the shipment of fruit which has not been fit to eat. That practice we must use every effort to stop. But at the same time we must give careful consideration to the other aspects of the problem and do nothing which is going to hold back the shipment of one box of oranges or grapefruit beyond the date when that fruit is really an edible commodity.

Now, just a word or two about the coloring of citrus fruit and I am done. The coloring of oranges and grapefruit by artificial means has been practiced in Florida for a great many years, but it has been only the past three seasons that the volume of pre-colored fruit shipped from the State has assumed proportions of any magnitude. To some extent I believe that I am personally responsible for this and if so I am perfectly willing to assume full culpability. During the spring of 1921, Dr. Lon A. Hawkins, with whose office in the U. S. Department of Agriculture I had been for several years co-operating in some storage tests of citrus fruits, brought to my attention the results of experiments which had been conducted in the coloring of Satsumas along the Gulf Coast, and inquired as to the possible advantages of the introduction of similar processes in handling Florida oranges and grapefruit. We discussed the matter carefully, knowing that we were dealing with a dangerous subject, and decided that some experimental work with Parson Brown oranges and Davis Seedless Grapefruit was justified. Accordingly I agreed to prepare the necessary coloring room at my grove near Homestead, and Dr. Hawkins arranged to send two of his assistants early in the fall of 1921 to make the tests. These plans were carried out and in September of 1921 we put through the coloring room what I believe was the first grapefruit colored in Florida by the gas process, which has now come into such general use. Others began experiments very shortly after we started, and you all know of the wild-fire spread of pre-coloring since that time.

With the characteristics of the Parson Brown oranges you are all familiar. The Davis Seedless grapefruit is not so well known and I may state that this is a variety originally propagated at the Little River test grove of the U. S. Bureau of Plant Industry. In the Redland section of Dade County it is the variety of grapefruit now grown almost exclusively, and during the past few years has also been planted in some other sections of the state. It has several good qualities which have no bearing upon the subject under discussion, but has two which very decidedly do. The fruit is of mild flavor, without being insipid, and will pass the 7 to 1 acid ratio test from two to four weeks earlier than Duncan, Marsh, Pernambuco or Common Florida growing, in the same grove. Yet practically any of these other varieties will show the so-called "color of maturity" long before the Davis Seedless. It is the Parson Brown of the grapefruit family with the difference that the Davis does not lose flavor after it takes on full color, and is really an excellent fruit for spring shipment.

I cannot speak for the others who took part in these earlier tests, but Dr. Hawkins and I certainly went into the matter with our eyes open. We knew that if some adaptation of the gas process proved as successful in the pre-coloring of oranges and grapefruit as it had with Satsumas, we were unleashing a pack of troubles for the Florida citrus grower. But we thought, and personally I still think, that we were justified in making the tests and giving full publicity to the results. We knew that in all human probability the process would be misused, but for that there seemed to be a perfectly practicable remedy.

To successfully market citrus fruit, there are two essential qualities which the fruit must have: It must have *appearance* to bring about the first sale to the consumer. And one requisite of appearance is color, for we have taught the consumer, through bitter experience, to shun green fruit. In the second place, it must be of such *edible quality* that the verdict of the palate will confirm the judgment of the eye and bring about repeat sales. If Parson Brown oranges, Davis Seedless Grapefruit, or any other varieties of citrus attain an edible condition before they become fully colored, and we can impart that color without impairing other qualities, are we not justified in so doing, when this means that these early ripening varieties may then be moved out of the way of the slower-maturing fruit, which makes up the great bulk of the crop which must be handled? Dr. Hawkins and I thought so in 1921 and I very positively think so now.

As to the abuses which have come with pre-coloring, your remedy is just the same as it is for the shipment of all other immature citrus fruit. Get behind a State law with teeth in it that will reinforce the present Federal regulations and let that law provide for a sufficient corps of high-class, well-paid inspectors to see that its own restrictions are fully enforced. You are entitled to it. Why don't you go to Tallahassee and get it?

The Federal Food and Drug Law and its Relation to the Citrus Industry

J. O. Clarke, Chief Food & Drugs Station, U. S. D. A., Savannah, Ga.

The Federal Food and Drug law, or as it is more properly known, the Pure Food law, was passed in 1906. When Congress passed this statute they had in mind an Act which would be regulatory in its nature, and not punitive. The law was designed to correct abuses which then existed, or which might later arise, in food or drug industries. In its final analysis, it is based on honesty and a square deal for the public and industry. Under its terms the channels of interstate commerce are closed to food or drug products which are misrepresented, in any manner, or which contain an added poisonous substance, or which are decomposed. In defining these classes of food products Congress used the terms adulterated and misbranded, and defined as adulteration several conditions which may apply to food. For instance, if a food product has been cheapened by mixing with it something of lower value, or if a valuable constituent has been removed, or if it is colored in such a way that inferiority is concealed, or if it contains an added poisonous or deleterious substance, or is decomposed, the law denies it the right to move in interstate commerce. The term misbranded in its final analysis, means any misrepresentation or deception in regard to the food which might occur.

When we analyze the things which are prohibited, we find that nothing is mentioned which an honest dealer would wish to do. As long as one tells the truth about the food which he markets, and it is not rotten or poisonous, he need have no fear of his standing under the law.

There is no need for me to tell you of the importance to Florida of the Citrus industry. It can be considered the very backbone of the state. Citrus fruit is one of the largest and most important food products grown in the South. Oranges have a place in the diet of children, very close to that of milk. They are rich in vitamines and other food elements which are desirable, if not entirely necessary, for the proper nourishment of the young. Grapefruit has become an almost universal breakfast food on the American table. There are nearly 250 well organized and equipped packing houses in the state. During the present season something over 27,000 cars of oranges, and 16,000 cars of grapefruit will be moved.

The citrus industry in Florida is supplying a necessary and delicious article of food to all parts of the United States, and is reaching out to foreign markets.

The leading restaurants and hotels in England today feature American grapefruit on their breakfast menus.

In any business which has assumed the size of the Florida Citrus industry trade abuses will always creep in. The Florida Citrus industry is freer from such abuses than a great many other large industries which have grown up in America. In my discussion at this point I would like to mention a few undesirable practices without reference to laws or regulations which might affect them. Later on I will touch briefly on the application to these practices of the Pure Food law.

To my mind the most outstanding abuse in your industry is the practice among a few packers, of shipping their fruit before it has reached that stage of development, where it is a palatable and delicious article of food, or in more common terms, before it is ripe or mature. The inducement to market immature citrus fruit is great. Early in the season the prices are high, due to scarcity in the consuming markets. It is only natural, therefore, that each packer should desire to get a part of his fruit on the market at the earliest possible moment, in order to take advantage of the favorable conditions. As a result of this desire a few cars sometimes move before the product has reached the stage of maturity. All of us deplore this condition, and I don't think there is any one who believes that it is right to market immature oranges or grapefruit. A ripe, mature citrus fruit is a most delicious article of food, but a green, sour orange or grapefruit is unpalatable and is not eaten with pleasure.

The first few cars of immature fruit which leave the state early in each season do usually bring a large return to a few individuals, but if immature they reflect on the entire Florida Citrus industry. You people in Florida do not try to eat this immature fruit, and yet a few shippers expect the rest of the American public to enjoy the stuff. The immediate result of a few cars of immature fruit is usually a drop in the market which reacts unfavorably on the mature fruit which follows. If these few undesirable cars were kept on the trees a little longer it would mean a ready and favorable market for the ripe fruit and in the end would react favorably to the industry as a whole. All of us have at heart the interests of the whole industry and desire to keep it free of fraud and deception.

The color process has lately been introduced into Florida. My mention of it here is not with the idea that it is an objectionable practice. Far from being objectionable, it is one of the indications that the industry is growing and making use of the latest devices to improve their output. However, it can be made a tool to perpetrate a considerable fraud, and to make the sale of immature fruit, if colored, a far more reprehensible practice than if uncolored. Until the season of 1922-23 there was no widespread use of artificial coloring devices in Florida. There has always been a very small amount of fruit which was colored by the well known device of shipping with the vents closed, thereby making a sweat box out of the car. Quite probably a few packers have in the past used an oil stove for the same purpose, however, beginning with last season nearly all of the packers have installed some device for coloring their fruit.

This color process properly used has the sanction and approval of the Department of Agriculture. In fact, the Department was responsible in a measure for the introduction of the system in this state, and have had representatives here during the past two seasons for the purpose of assisting in the installation of coloring devices.

Artificial coloring is of great value in marketing those varieties of oranges which are mature before the rind has assumed a yellow color. The public wants yellow oranges and in the public mind a yellow color is indicative of maturity. Therefore, the varieties which are mature while having a green rind were at a distinct disadvantage when offered for sale alongside of other varieties of normal color. The use of color rooms as originally conceived, was to put the green colored mature fruit on the same plane as the yellow.

The shippers in the early season have to make sure that their fruit stays on the tree long enough to reach maturity. In quite a similar manner they have to watch closely in the late season to be sure that it is not allowed to stay on the trees too long, resulting especially in oranges and tangerines, in a drying out of the juice. The fruit, to which I refer is commonly known as tree dried. It occurs most frequently in tangerines and in the larger sizes of oranges, 126 or larger. Beginning at the stem end the dried or pithy condition progresses until the whole fruit is simply a light ball of fibrous material, covered with an orange skin, and is entirely devoid of juice.

I am sure that none of you would deliberately contaminate your pack with such tree dried oranges, yet they are frequently encountered in the consuming markets.

The marketing of immature fruit and tree dried fruit constitute two of the principal abuses in the Florida citrus industry. The past several years, fortunately no freeze has occurred in Florida, and it has not been necessary to guard against fruit which has been frost damaged. This is a condition which might occur during any year, and which at any time might prove a source of major importance.

Some of the minor abuses which sometimes occur consist of misrepresentations to the buyer as to variety or size. Needless to say, good trade practices and fair dealing would require that any statement relative to size or variety which a packer prints on his box should be true. Another minor matter, which I do not believe is practiced at this time, was the use of a sub standard box, which was short about one quarter of an inch on each dimension. While such a box would represent a minimum of fraud in one car, it would in a season give a decided advantage to the user.

My discussion thus far has been confined to the abuses as they exist, without reference to the possible application of the Food and Drug law. I will now point out to you how the law tends to correct such practices. The words Citrus Fruit do not occur in the text of the Act, and in applying it to such an article of commerce, it is necessary to apply its general provisions to specific cases. These provisions have to be interpreted by the administrative officers of the Department of Agriculture, and applied to specific cases. All such interpretations, however,

in their final analysis are subject to review of the Federal Court.

The most important provision of the law as it relates to the citrus industry, is that section which defines as adulterated any article of food which is colored in a manner whereby damage or inferiority is concealed. The Department considers as immature citrus fruit as an inferior article, therefore, if the immature citrus fruit is artificially colored to conceal its inferiority and is shipped in interstate commerce, it is in violation of the law. The color of an orange or a grapefruit is an indication to the average purchaser of its maturity. This in spite of the well known fact that some varieties of fruit are green in color, while they are mature. If the purchaser, therefore, buys fruit which has a yellow color, he has a perfect right to expect that the fruit is mature. The green skin of an immature citrus fruit is a warning to the average purchaser that the fruit might not be ripe. If he wants to buy it with the warning implied by its green skin, he is not deceived. When, however, he buys a fruit with a beautiful yellow color, he is entitled to the assurance that the yellow color was not put there by artificial means to hide the true condition of the article.

Immature fruit in itself is not denied the channels of interstate commerce. Naturally, there is no objection to the shipment of mature fruit which is artificially colored. The violation of the law takes place when one ships in interstate commerce citrus fruit which is both immature, and has been artificially colored.

Tree dried citrus fruit falls under two provisions of the law. In the first place, a valuable constituent, the juice, has been removed and it is therefore, adulterated. Further, decomposition has set in and it falls under the section which defines a decomposed vegetable substance as adulterated. Naturally, it would not be just to condemn a car of fruit because it contained one or two oranges which were tree dried. This small amount of such fruit would be an accidental contamination. While no tolerance, or maximum percentage of tree dried fruit in a shipment has been announced by the Department, they are taking suitable action against any shipment which contains a considerable amount of such fruit.

The minor abuses which occur in the industry lend themselves quite readily to correction through the medium of the Food and Drug law. A misstatement on the containers of an article of food is defined as Misbranding. Therefore, if any misstatement relative to size, variety or amount is made on the box, the product is classed as Misbranded.

Insofar as food is concerned, the law makes only one provision as to what one must do. All other provisions relate to what one must not do. I refer to the section requiring a statement on all food in package form of the quantity of contents. This provision is almost universally observed in the Citrus industry. The requirements with respect to net contents fit in nicely in controlling the use of substandard boxes, since on such boxes, the users would have to declare the net contents and such a declaration would inform the purchasers that they were not getting a standard article. Any failure to state the net contents or an incorrect statement, would class the article as misbranded.

The Coloring and Marketing of Green Fruit a Calamity to the Grower

Clinton Bolick, Ft. Myers, Fla.

Before entering upon this most important subject I must confess that I am among the guilty who colored and marketed green fruit the past season and it is with regret that I must make this confession although there were over one million boxes of Florida Citrus crop marketed before we cut a fruit from our trees. This fruit being greenish in color although it passed the acid test, had to be colored in order that it would catch the consumer's eye.

It was through the urgent request of northern dealers that we were forced to pick some early fruit. They advised us that their competitors were handling fruit and if we expected their trade to handle our fruit we must get some in the market. Now I do not want to pass the buck as to the marketing of green fruit, to the dealers in the north for we growers knew the condition of our fruit and we might have known that if any ill effects would come from this deceitful practice that the calamity would fall on us.

No doubt there is a great deal of truth in subject assigned to me for a near calamity has come to most every grower. But we cannot blame the marketing of green fruit entirely for the market conditions.

The enormous crop of apples, grapes, peaches, pears, prunes, apricots has all tended to hold down our citrus markets. Have the growers of these deciduous fruits made any money this year? No. They have their problems to work out as well as the citrus grower.

I recall a remark made at the Orlando meeting by Mr. Miller of the Fruit Auction Company of New York when he was asked what the trouble was with the Citrus markets, he stated "you filled our markets full of colored green fruit in October and November, later you glutted the markets with fairly good fruit but the bitter taste left in the mouth of the consumer from this green fruit made them skeptical buyers of your good fruit." Now how many growers were eating from the fruit we were shipping last October and November.

The question of great discussion has been when is citrus fruit ripe or mature. Laws have been made to try to determine its maturity. Chemical tests and standards have been made whereby its maturity may be passed upon, but do any of these mean anything so long as every packing house in the State has its coloring rooms. Why! I had Valencia oranges as green as grass in color last December which

passed the acid test and all the grapefruit I shipped last November passed the test required by law, but were they good to eat? No. Now is there a remedy whereby this unfortunate practice of coloring green fruit and the practice of selling immature fruit to the consumers can be stopped.

Fellow Growers, the most satisfactory way to test your fruit is to eat some of it, if it is pleasing to your palate evidently it will please our northern buyers.

Your State Chemist will tell you that the ratio of "Acids to Solids" indicates ripeness. He will also tell you that citrus fruit will show a much greater percentage of sugar when the fruit after maturity, remains upon the tree; furthermore he finds that fruit will not change in sugar or acid content after its removal from the tree, and again he will tell you that color bears no relation to maturity.

Now after considering the above very closely what is the best guidance for we growers to take in determining the ripeness of our fruit.

The consumer tests the ripeness and quality of our fruit by its taste. Fellow growers, lets let our conscience be our guide and let our taste be our test for maturity.

It will require organized efforts of every citrus grower, every selling agency, and every packing house in the State to stop this unscrupulous practice and to overcome the unfortunate conditions now prevailing and to reestablish the confidence of the trade and to regain our former reputation for sweet and juicy fruit.

Now are we going to show little or no interest in the coloring and marketing of immature fruit next fall and have this great industry handicapped by a few growers who will defy the law of self respect, and the growers of this wonderful state meet with a calamity such as they have this season. People, this is not only a grower's problem, it is the banker's problem, it is the merchant's problem, it is the problem of every citizen of this great State of Florida.

Let us hope that public sentiment among the business people of our great State will be strong enough to compel the few who disregard self respect for selfish financial gain and who will try to market immature fruit to discontinue this practice and let us make our business ethical by practicing the teachings of the Golden Rule.

It is evident that we are going to have a skeptical market next fall, the consumer is going to be a skeptical buyer and we cannot do much toward regaining his utmost confidence.

We did not consider the consumer last fall when we were marketing the two million boxes of immature fruit. Now they are the people who hold the real balance of power. Our profits are governed by the influence they have over our products. Gain their confidence and we will have a better market for our fruit.

We must not forget that we are at the mercy of the consuming public and too much emphasis cannot be laid upon the fact that our business success as growers is always the results of high ethical standards.

We don't plead sentiments, we must demand rock bottom principles and to start this great industry back to success for the growers, it is vital that we ourselves shall be known to practice what

we ask our fellow business men to practice.

The policy which we followed last fall contained the germ of moral decay, the loss of human respect and industrial degradation, the buying world has accused us of moral turpitude.

All of us here are business men and women. We know that all good and successful business is constructed and transacted on the basis of confidence.

Good will is its most valuable asset. Honesty is an asset, dishonesty a liability.

Is the marketing of colored and immature fruit an asset to the citrus industry? The trade told us, it was dishonestly misrepresenting our products. We found it was our selfish enemy, and a near calamity to the growers of the State of Florida.

Fellow Growers, we pay no packing charges, no freight, no selling cost on the good will of our industry, nor do we pay anything for our customer's confidence.

We, the growers, are not in the business for pleasure, nor are we in for grief, we are in it for a livelihood and a legitimate profit. We have our grove as an investment, and if we expect to prosper we have got to adhere to high business principles; by giving the buying public a good product at a legitimate profit.

Fellow growers this industry is our baby—it is young—we could cover it with flowers; we could spray it with perfumed words of praise; but that don't get us anywhere, our industry is real, the industry is in earnest, it is full of duties to perform, so let us begin now and establish it on a basis of rectitude and square dealing and let us determine our own future conduct as growers, take wide views and lay down definite rules for a continued success of all departments of our own wonderful industry.

Mr. Tolman: I want to ask a quesiton: I wonder if any attempt has ever been made in this State to get an inspector to condemn a car of that fruit, make a moving picture film of it before destroying it?

Clarke: We have seized numerous cars and a number of cars have been destroyed. At least 100 cars have been seized.

Dean Glass: I want to say I think a vote of thanks ought to be given to Mr. Bolick. They have been trying to camouflage this whole business. There has been dishonesty behind it, and Mr. Bolick has said frankly "I am a party to it." He has honestly said what is in the mind of every one of us. I think he deserves a vote of thanks.

Mr. Skelly: There has been a good deal said in past years, and too much this season, about our fruit being immature, and that noise has kept up to the present time. Now we have over-ripe fruit and dry fruit going to market. In my opinion dry fruit and over-ripe fruit is worse than immature fruit.

I am not in favor of shipping immature fruit. We have a law, but I don't think the growers of this State need any law with teeth in it. It's just as one of the gentlemen said—"Go and eat your fruit; if you can't eat it, yourself, don't ship it." That's as good as any acid test. We

have scared the people so much in the Nortn that they are afraid our fruit is immature yet. I asked why fruit wasn t selling better. It was spreading this information out. How are we going to correct it? A Fruit Committee has been appointed, a committee of five, of which I am one, and we are seeking to have the Government inspection made on this end of the line as to the maturity of citrus fruit. This certificate is to be issued by the Government. The sooner we secure maturity according to the acid test, if we can get that, and stop the noise about immature fruit, we will be better off.

Everybody is talking poor markets and the green fruit that Florida has. It will give us all more time to do things. I think the Government will issue certificates of maturity of fruit. If they do that we don't need any laws on immature fruit. If Mr. Bier is in the audience he can give you some information.

Mr. Bier: I was going to bring that matter up in my talk tomorrow. When the shippers had their discussion in Orlando last week I was called in to talk to them concerning the issuance of Federal certificates, and whether on those Federal certificates we could give the acid test, and such other tests as they, on the other end, would like to know. I told them we could. It was my opinion if we brought publicity into this thing you would do more toward solving the fruit problem. The receiver is justified in having this information. You can be given this by the Shipping Station of Inspection, operated by the Government.

Mr. Skinner: Before leaving this subject I would like the privilege of saying just a few words. Mr. Krome said the truth when he said "When you monkey with this coloring business you are monkeying with dynamite." It is something that is very dangerous, and I think it's not so much the immature fruit that was shipped that has done the damage—the fellow at the other end can explain immature fruit; he understands it. But when you take this Florida orange with its fine flavor, when it passes the 8 to 1 test, and put it in a coloring room—a crude, unfinished affair, something that is not intelligently handled, handled by somebody that don't know much about it—you are certainly acting with a dangerous thing. Fruit put into a coloring room should not, in my opinion, be in the coloring room to exceed 36 hours. Especially is this true with the crude method that we are using in this State at the present time, and which I think should be abolished or improved, as I will state in a moment. This gas that we use contains a good many things besides the ethylene gas. The ethylene does the coloring and if conditions are not right it will not color the fruit in the proper time. You have to have moisture about 80 per cent; you have to have around 80 degrees heat, and you will remember that last November was a cold and dry month, and people used this coloring process that Mr. Krome said was dangerous who didn't know how to use it. They kept it in there 36 hours, and it didn't color it; they kept it in 46 hours and it didn't color it; 56 and it didn't color it; and so on. They kept it there as long as 96 houre and it didn't color it. By that time the stuff was not fit for a pig to eat, say nothing about human beings. There were thousands of cars of just that kind of stuff

that went to market. I think the coloring process is all right, as the Government has said, and as Mr. Krome has said, but I think if we are going to use a dangerous tool let us use a tool that is right. Many of us were afraid of the ethylene gas, because we thought it was dangerous, but Mr. Winston tells me that it has to be 1500 times as strong to be inflammable as the strength we should use it at in our packing house. It leaves no taste. I have tasted some of this fruit left a long time, and it is wrong—absolutely a crime. A man who ships fruit that it takes 96 hours to color is a Judas to the State of Florida. If we are going to monkey with this thing, let's get the right sort of tools to do it with, and then do it right.

Mr. Sandlin: We are getting adverse advertisement from immature fruit, and it seems that at the convention held at Bartow, there was a resolution passed, trying to raise the acid test to 8 and 10 on grapefruit and oranges respectively, which Mr. Krome recommends we get, and which was defeated in the convention in Orlando. It seems to me that we all want practically the same thing, but we have a different viewpoint as to how to arrive at that final conclusion, so they have temporarily agreed to put on the label of the box "Mature Fruit," so as to guard against some of this crime you were just speaking of, where they kept it as long as at least 70 hours.

It seems that it is only fair and just to the industry, and it will work no hardship on anyone in the business, or to the grower, if they will go a step further, and especially having in mind that the Fruitmen's Club is now working on a plan whereby to get Federal Inspection, which will look at the case from the standpoint of merit and not from that of favor to the consumer or grower, and that is to protect these inspectors by asking for a ruling to be made whereby a grower or a shipper cannot obtain a bill of lading from any transportation company to transfer citrus fruit from the State of Florida until he files with the local agent a certificate from an authorized inspector, showing that the fruit has stood the maturity test as set by the government. I think this worthy of due consideration from this Society—to see whether it is not a good policy to adopt, and recommend to the State authorities and the government authorities, for if we are going to have these inspectors, we want to cooperate.

Mr. Skinner: There is no question in my mind but what the remedy lies along the lines you have stated.

Mr. Krome: I read my paper for the purpose of preventing misquotation, and I would like to correct the statement that Mr. Sandlin made in which he stated that I, in that paper, favored the pushing up to the standards of 7 to 1 and 8 to 1. I tried to make it plain that I positively favored the holding of those standards just where they are.

Mr. Skinner: The Chair was going to make that correction.

Co-operation in Law Enforcement

R. E. Rose, State Chemist, Tallahassee, Fla.

It is needless to say that I am pleased to again meet the members of our Society, of which I have had the privilege of being a member for more than thirty years; and particularly to meet you in Tampa, whose wonderful growth and development has been phenomenal since I first visited it in 1882, on which occasion I drove a horse and buggy from Kissimmee, then only a name, through the unbroken forest. At that time, Lakeland and Plant City did not exist, and oranges were hauled by ox teams from Orlando and other interior localities for shipment to New Orleans by the Miller & Henderson line of steamers, the "Amite" and "Lizzie Henderson." Tampa was a village of less than two thousand inhabitants, with only frame houses, no paved streets and no sidewalks. The principal industry of South Florida was range cattle, which were shipped from Tampa and Punta Gorda to supply the Cuban market.

At that time the citrus industry was in its infancy. Groves were confined to locations near navigable streams, the St. Johns, the Ocklawaha, the Indian and Halifax rivers; where the fruit, packed in home-made crates or boxes, could be hauled conveniently by ox teams. The South Florida Railroad had been built by the Editor of the Boston Herald, Mr. Pulsifer, from Sanford to Orlando in 1879(?); the first sod turned by President U. S. Grant; a narrow-guage railroad with twenty-five pound rails and a five-ton locomotive; a newspaper railroad, literally and actually.

So much for the value of newspapers and advertising.

The Florida sweet seedling was the only citrus fruit produced at that time. It was grown from seed from select trees, producing the best fruit; generally grown on hammock land rich in humus, located conveniently to water transportation; within reasonable distances of the boat landings. Commercial fertilizer was practically unknown; the only means of fertilization then known was by "cow penning;" a method of fertilizing which has no superior; adding not only the necessary nitrogen, phosphoric acid and potash, but particularly humus, one of the most necessary adjuncts of a fertile soil.

Indian River oranges were transported by sail boats to a landing on Indian River, thence hauled to a landing at the head of Salt Creek, a tributary to the St. Johns, above Lake Monroe. A short line of railroad was also built from New Smyrna to Blue Springs on the St. Johns to handle the fruit from the Halifax River; another was being built from Astor on the St. Johns to Eustis.

The demand for Florida oranges was far greater than the supply; and five dollars per box, cash, f. o. b. steamboat landing, the price. At that time, and for years after, the sweet seedling was practically the only Florida orange; and its reputation as the best and most excellent orange produced was unanimously acknowledged. This was the condition in 1882.

While not an orange grower, I have, therefore, been familiar with the industry for some forty-three years; and have seen it grow from less than 1,000,000 boxes to practically 20,000,000 boxes, with the prospect of 40,000,000 boxes in a few years, when the many thousands of acres of young groves, now planted, come into full bearing. The market report of "The Florida Grower" of April 12 shows that the shipment of Florida citrus fruit to that date was 42,401 carloads; which at 300 boxes per car represents 12,720,300 boxes. As the shipping season is by no means over, I consider my estimate of 20,000,000 boxes for this season, and the estimate of 40,000,000 boxes in a few years, conservative.

I have seen the quality of Florida oranges, when shipped immature, sour and disgusting, destroyed by the "speculator" and "green fruiter;" and the former reputation of Florida oranges for excellence destroyed by the iniquitous, dishonest, and illegal practice of artificially coloring immature citrus fruit.

This has been generally practiced but a few years. The result, however, is disastrous; as shown by the returns of this and the last season, 1922 and 1923; as shown by the records of the Agricultural Department; when, from the first of September until the latter part of November, many cars of oranges and grapefruit, immature and sour, were sold for less than the freight charges; to say nothing of the cost of producing, crating and delivery to the packing house, generally equipped with "coloring rooms."

It has been my duty to frequently visit northern, eastern and western states for conference with the Food and Health control officials of the states and the nation; men directly interested in preventing the sale of adulterated, misbranded and deleterious foods, from every state, and many of the larger cities. A large proportion of these gentlemen have asked "Why has Florida citrus fruit so depreciated in quality? Who so sour and unpalatable? What has become of your delicious, sweet and desirable Florida orange?" I could only reply "They are not ripe. They have been artificially colored to simulate ripe or mature oranges."

Naturally, the next question was "Do not the national and state laws prohibit the sale and shipment of 'adulterated or misbranded foods;' or foods that are 'mixed, colored, powdered, coated, or stained in a manner whereby damage or inferiority is concealed?" My reply was that both the national and state laws prohibit the sale or shipment of such illegal foods. "Then why is the law not enforced?" My reply was "For the same reason that the prohibition of the sale or transportation of intoxicating liquor was not enforced by either the nation or state. The 'green fruiter' and 'bootlegger' are active, persistent and unscrupulous; while the large part of law-abiding citizens, particularly consumers, are not; they sim-

ply decline to purchase immature citrus fruit or bootleggers' liquor."

"Is there a remedy for this unfortunate condition?" "I believe there is, but it will require time and work on the part of the citrus growers to stop the present general practice of selling and shipping immature, sour, disgusting and undesirable citrus fruit."

It takes time and work to regain a good reputation in morals or business and to again establish public confidence in a man or a commodity. A slight modification of our statutes is needed, and some teeth put into the present law; and the active co-operation of the growers to aid the executive officers and the courts in enforcing the law.

Citrus growers should do as members of other organized manufacturers do; send representatives to Washington and to Tallahassee, to confer with the U. S. Secretary of Agriculture and the Florida Commissioner of Agriculture in protecting their legitimate business from manufacturers, dealers or shippers of adulterated, misbranded, artificially colored, or deleterious foods.

It has been suggested that the standard be raised. This would retard and for years prevent changing the present standard, now adopted by the national authorities; after fourteen years of strenuous labor by the U. S. Bureau of Chemistry, the Florida State Laboratory, the California authorities, and several reputable commercial laboratories. An amendment should be adopted, exactly conforming to the U. S. standard for mature citrus fruit, Food Inspection Decision No. 182 of September 20, 1921; as appears in the Report of the State Chemist of Florida for 1923, pages 49 and 50.

I have taken the liberty to prepare an act to submit to this convention for its consideration, adoption or amendment; which, in my opinion (after twenty-three years' experience in enforcing the control laws of the State) will prevent future violation of the law; and which, with the assistance of executive and administrative officers, the judicial and prosecuting officers of the nation and state, the organized growers, and the public, will regain for Florida citrus fruits its former reputation for excellence; and secure a remunerative price for as large a crop as Florida can produce for the millions of American consumers, who are able and willing to pay a fair price for honest goods; but who will not allow themselves, knowingly, to be swindled a second time, by deceptive goods of any kind.

May I suggest that one unfortunate condition exists in Florida; that is, the large number of so-called "improved varieties;" almost as many as sold by a noted pickle manufacturer, and when shipped immature are as sour as his pickles preserved with acid.

Not to exceed three varieties should be produced for shipment in interstate commerce; an early, a mid-season, and a late variety. We have such varieties maturing at different seasons.

Citrus growers and shippers associations should be organized similar to the potato growers of Maryland and at Hastings, Florida; the strawberry growers of Jersey and Florida; and the peach growers of Georgia, who for years consigned their product, or sold to wild cat speculators at tremendous losses; but who now

consign only to their association and are paid the market price, cash on delivery to the transportation company; and the goods sent to destinations where their association has sold them at an agreed price. The association, being advised by wire at all times as to supply on hand and the prices at various markets throughout the country, and being the only selling agency, controls the market and the price; and does not fear the "wild catter" shipping into the same market sufficient consigned goods to demoralize the local market.

The success of these organized co-operative associations of producers of perishable fruits and vegetables has been phenomenal. The producers, the banks, the merchants and the businesses of the locality are prosperous; where, prior to the co-operative association, money was scarce, credit unobtainable and growers bankrupt.

It will require time, money and labor and the united effort of the organized citrus growers of the State to overcome the unfortunate conditions now prevailing, to re-establish the confidence of the public, and to regain the former reputation of Florida citrus fruit for excellence, destroyed by our short-sighted policies, and lack of ordinary common sense and business methods.

Organized co-operation: But a few years since, when the citrus industry was threatened with destruction by citrus canker, the organized citrus growers sought and obtained the co-operation of the legislature of Florida and of Congress, which was promptly granted; and more than one-half million dollars contributed by the nation and state to stamp out the pest threatening the destruction of an American industry, and large sums are still being expended to prevent its future outbreak.

A condition now practically as serious confronts the citrus grower; a situation caused largely by his own folly, and his failure to correct an evil entirely within his own control; his neglect to aid in the enforcement of the law by executive officers and the courts of the State, or to aid in the detection and prosecution of violators of the law.

A BILL
TO BE ENTITLED

AN ACT to amend Section 2049, Section 2051, Section 2053, Section 2054, and Section 5518 of the Revised General Statutes of Florida, 1920; and to prohibit the artificial coloring of citrus fruit.

Be It Enacted by the Legislature of the State of Florida:

Section 1. That Section 2049 of the Revised General Statutes of Florida, 1920, shall be amended to read as follows:

Section 2049. *Unlawful to sell, ship, or conspire, aid or assist in selling or shipping immature citrus fruits; not to apply to sale on trees.*—That it shall be unlawful for anyone to sell, offer for sale, ship or deliver for shipment, or to conspire, aid or assist in selling, offering for sale, shipping or delivering for shipment, any citrus fruit which is immature or otherwise unfit for consumption; and it shall be unlawful for any one to receive

any such fruit under a contract of sale, or for the purpose of sale, or of offering for sale, or for shipment or delivery for shipment. This Section shall not apply to sales or contracts for sale of citrus fruits on the trees under this Section.

Section 2. That Section 2051 of the Revised General Statutes of Florida, 1920, shall be amended to read as follows:

Section 2051. *Test of Maturity.*—That for the purposes of this Act all oranges or grapefruit shall be considered immature which do not conform to the following definitions and standards for mature oranges and grapefruit, adopted by the National Joint Committee on Definitions and Standards, March 23, 1921, approved by the Association of American Dairy, Food and Drug Officials, October 7, 1920, and approved by the Association of Official Agricultural Chemists, August 19, 1921; and adopted and promulgated by the Secretary of Agriculture of the United States, September 20, 1921:

"Grapefruit, pomelo, is the sound mature fruit of citrus grandis Osbeck. The juice of the mature fruit contains not less than seven (7) parts of soluble solids to each part of acid calculated as citric acid without water of crystallization.

"Orange (common, sweet, or round) is the sound, mature fruit of Citrus sinensis Osbeck. The juice of the mature fruit contains not less than eight (8) parts of soluble solids to each part of acid calculated as citric acid without water of crystallization."

Section 3. *Unlawful to artificially color immature citrus fruit.*—That it shall be unlawful for any person to artificially color immature citrus fruits by any means, or to conspire, aid or assist, in artificially coloring immature citrus fruit by any method or means; in "coloring rooms," or by shipping in a railroad car "Released, vents closed, plugs in." It shall be unlawful for any railroad agent in Florida to accept for shipment any citrus fruit "Released, vents closed, plugs in," or to issue any way bills for citrus fruits "Released, vents closed, plugs in."

Section 4. That Section 5518 of the Revised General Statutes of Florida, 1920, shall be amended to read as follows:

Section 5518. *Penalty for shipment of immature, or artificially colored citrus fruits, and for misbranding packages containing citrus fruit.*—Any person or persons who shall sell, ship, or deliver for shipment any immature or artificially colored immature citrus fruit, or who shall conspire, aid or assist in the violation of any of the provisions of this Act, or Section 2049 as amended, or Section 2050 of the Revised General Statutes of Florida, 1920, shall, upon conviction, be punished by a fine of not less than one hundred dollars, nor more than one thousand dollars, or by imprisonment for not more than one year, or by such fine and imprisonment, and the fruit, whether immature, artificially colored, or otherwise unfit for consumption, or misbranded, shall be subject to seizure and disposition as in the case of adulterated or misbranded foods.

Section 5. That Section 2053 of the Revised General Statutes of Florida,

1920, shall be amended to read as follows:

Section 2053. *Employment of citrus fruit inspectors.*—The Commmissioner of Agriculture shall employ twenty citrus fruit inspectors for a period extending from September 1 to December 31 of each year, for the purpose of enforcing this law. Their salaries shall be $150.00 each per month, and they shall each receive $150.00 per month for traveling expenses.

The Commissioner of Agriculture shall also employ four citrus fruit inspectors from January 1 to August 31 of each year whose monthly salaries and traveling expenses shall be the same as those provided in the preceding paragraph.

The citrus fruit inspectors shall be governed by the general provisions, rules and regulations as provided for inspectors under the Pure Food and Drugs Law.

Section 6. *Inspection fee.*—A fee of one-half cent per box shall be paid on all citrus fruit grown, packed, shipped or delivered for shipment in Florida. Payment shall be evidenced by a revenue stamp attached to each box; and it shall be unlawful for any railroad or other transportation company to accept any citrus fruit which has not the citrus revenue stamp securely attached to each box. The letter of request for citrus revenue stamps, with the money therefor, shall be directed to the State Treasurer, and shall contain a statement of the number of boxes for which stamps are required. The State Treasurer shall hand to the Commissioner of Agriculture the letter of request for citrus revenue stamps, which order shall be filled by the Commissioner of Agriculture, at once, if found correct.

Section 7. That Section 2054 of the Revised General Statutes of Florida, 1920, shall be amended to read as follows:

Section 2054. *Annual appropriation.*—The sum of thirty-five thousand dollars, or as much thereof as may be necessary, is hereby annually appropriated from the funds arising from the citrus revenue fees, for the enforcement of this law.

The Comptroller is hereby authorized to draw his warrants for the payment of the same.

Section 8. All laws or parts of laws in conflict herewith, be, and the same are, hereby repealed.

Improvement in Quality of Citrus Fruit

R. E. Lenfest, Winter Park

The need and value of good quality fruit has been very forcibly brought to the attention of everyone during the past shipping season. Had all packing houses graded as closely and carefully as they could have done there is little doubt that the value of good fruit would have been even more clearly shown.

In discussing methods of securing quality fruit we must keep in mind that it is a business proposition and that we must hold production costs as low as possible. Since groves differ greatly in their needs and possibilities and the same conditions or sequence of conditions seldom occur twice in succession in any grove, only the basic principles underlying the proper and practical methods for securing and maintaining quality in citrus fruit will be discussed. This will be handled under the following four main divisions of grove practice: pruning, spraying, cultivation, and fertilization, with some reference to stocks and varieties.

PRUNING

The old saying that the time to prune is when the knife is sharp is quite true, however, the condition of the tree must also be considered. It is hardly advisable to do much pruning when the trees are carrying a heavy crop or when they are putting out a bloom or flush of new growth. However, if done carefully, some pruning of bearing trees to remove dead wood, unnecessary and weak wood, and to a certain extent shaping the tree, may be done at any time, but a better job can be done when not hampered by any one of the above conditions.

Heavy pruning of live wood from bearing trees is very likely to cause at least the next crop of fruit to be coarse and of poor quality unless the proper balance regarding fertilization and cultivation is kept in mind and definitely planned for, following such heavy pruning.

Care should be exercised not to remove thrifty bearing wood from the inside of the trees in a well intentioned effort to "open out" the trees to let air and sunshine in. The inside fruit is often the best on the tree—possibly due to the fact that it is produced on the more mature part of the tree instead of near the vigorous growing part on the outside of the tree.

The removal of deadwood helps reduce the amount of melanose and this aids in the improvement of quality.

Before leaving the subject of pruning it will not be out of place to mention the fact that non-bearing trees, especially for the first two or three years, should be

pruned as little as possible, and that only to remove root sprouts, or clip back extra vigorous sprouts which, if not clipped, make a long, weak growth that droops over to the ground.

SPRAYING

None of the operations in a grove can be successfully or economically carried out by the calendar, and this is especially true of spraying. To spray by date is generally a waste of time and material.

A spray schedule is of value only as a reminder of when to be on the watch for diseases and insects. The grower must be familiar with the various diseases and insect pests in his grove. He must be able to recognize the different stages in the development of diseases or insects and know at what stage the spraying is to be done. Still further, he must know what spray material should be used for each of the diseases or insects; having all this information it is necessary that *very thorough* spraying be done before profitable results can be assured.

The use of dusts, if the work is properly done, generally gives good results, especially in checking rust mite injury, and to a certain degree the spider mites. Regarding rust mites, we should never forget that they can damage the fruit at any time and not just during a short period in the summer. Often a crop is kept bright till fall and then given no more attention, with the result that during the fall or winter the rust mites get busy and lower the grade from bright to golden, or russet.

So far we have been considering mainly the external influences which to a degree affect the quality of the fruit. In taking up the problems of cultivation and fertilization we will be dealing with those factors which work through the tree itself and affect both the internal and external qualities of the fruit, and thus directly affect its value in the market.

CULTIVATION

Cultivation, when practiced, accomplishes primarily four things: The control of troublesome weeds and grasses, the conservation of moisture, stimulation or root growth, and thus of the tree and fruit; and the working into the soil of cover crops and fertilizers. Cultivation should never be done just to keep someone busy. There should always be some definite reason for working a grove and whenever possible the cultivation should accomplish more than one thing. Following this plan will quite often result in a reduction of costs because of less cultivation.

In connection with production of quality fruit it is absolutely necessary to keep in mind the fact that cultivation materially stimulates root growth and thus affects the growth of the tree and the fruit. Since this is true the cultivation should be reduced as the fruit approaches maturity. The early fruit is, as a rule, maturing at the close of the cover crop season and thus does not receive such a great deal of cultivation before the time for packing arrives, especially if the cover crop is mowed one or more times.

Mid-season fruit does not get off quite so easily, while the late varieties are sure to have their quality impaired by the continued cultivation during the fall, winter and spring months. Thus it is advisable to plant varieties in separate blocks.

The following comparison of two late Valencia groves will serve as an illustration: They were visited late in February by the writer in company with a packing house manager. One grove had not been cultivated since the previous September. There had been plenty of rain so that it had not been necessary to conserve moisture. The fruit on this grove was of good quality both internally and externally and was well colored. The color and condition of the trees was good—the fall fertilizer had not been worked in. The other grove only a few miles distant had had an equal amount of rain but had been cultivated at about two-week intervals during the fall and winter. The fruit was large size, coarse internally and externally, and further, the color was almost entirely green. The condition of the latter grove is one that is altogether too common.

A summary of these remarks on cultivation indicates that frequent cultivation is often practised at the expense of quality.

Where irrigation is not possible cultivation seems to be necessary at times to conserve moisture but should not be carried to excess. Also deep cultivation should not be practiced.

Regarding changing from cultivation to non-cultivation in bearing groves without irrigation it would probably be a wise plan to go about this change gradually and build up the natural organic content of the soil as rapidly as possible, especially in the higher and lighter soil sections. By following such a plan the grower can determine just how far and how rapidly he may move in that direction. A young grove can be handled from the beginning with the idea of making it a non-cultivation grove and have the humus content of the soil steadily built up.

FERTILIZATION

Fertilization is also very important in its effect on the quality of fruit, and therefore should always be given very careful attention. The ammonia and the potash seem to be the plant foods that affect quality more than anything else in the fertilizer. In the use of potash there is a wide range in the amounts that may be used without a correspondingly wide range in its effect on the quality of fruit produced. The range in the use of ammonia is small with a wide range in the effect on the quality of fruit, and with the many sources of ammonia we have a problem that is of great importance. Citrus trees will produce the best fruit of which they are capable if given a steady, even supply of ammonia along with the other necessary plant foods. To do this it is advisable to use several sources of ammonia, either in the mixed fertilizers or in combination with the cover crop, and to have an average from all sources throughout the year of about half organic and half inorganic ammonia. If the system of non-cultivation is practiced it will be advisable to use a larger proportion of inorganic ammonia. The trees can be stimulated by the ammonia given them even more quickly than by cultivation, thus we must be careful not to impair fruit by too enthusiastic use of ammonia.

Here again, it is advisable to treat the early and late varieties differently, at least as to time of fertilizing, as well as of cultivating in the spring with a crop of late fruit still on the trees.

Spreading the fertilizer evenly and broadcast in bearing groves is a great help in furnishing the trees with a steady food supply.

We have all heard the older citrus growers say that years ago there were not so many diseases and insects. There is a good deal of truth in this statement. Of course, a number of diseases and insect pests have been brought in. But the fact remains that, due to the desire in recent years to make the trees do more they have, in many instances, been forced up to the peak and then down the other side, resulting in unthrifty tree conditions, which allowed such diseases as withertip and melanose to do great damage.

Regarding citrus stock, no attempt will be made in this paper to prove one to be superior to another. Since most of the acreage planted in recent years has been on rough lemon stock it is of vital importance that careful study be given to determining methods by which trees on this stock can be made to produce the best fruit of which they are capable. Different root stocks require somewhat different methods of handling.

Cultivation of Bearing Groves in Relation to Quality of Citrus Fruits

J. G. Grossenbacher, Apopka

It seems that most of the things that I had planned to say on this subject have already been more fully discussed in some cases than I expected to, so I will briefly go over some of the things that perhaps might be emphasized, in addition to what has been said.

Of course, the problem is to have smooth fruit—fruit with a rind that might be said to feel like an inner tube inside of a tire. If the rind is perfectly smooth you have a smooth texture fruit, and if you will run your finger over it, it will feel much the same as the rubber of an inner tube, instead of the rough feeling of fruit as we have now in the majority.

There are two antagonistic notions. One of them is that you have to make the tree and volume of fruit, and the other is that you must produce quality. We have the enthusiasts for non-cultivation, who have emphasized the fact that that is the way to get quality. Of course, that's true. You improve your quality in that way. On the other hand, on high pine land, that is poor, and perhaps short of moisture part of the year, you have to keep in mind the health of the trees in addition to the quality of the fruit. So as a matter of fact, I believe that the main idea for the high land fruit grower of citrus fruit is to use the best of both of the methods. Don't practice the intensive cultivation that has grown up during the period of tree growing, which has been so characteristic of a large part of Florida, in the last fifteen years, but change over to the bearing type of cultivation. I don't mean non-cultivation, that is practiced in some of the low lands where the soil is rich and contains abundant moisture, and where quite often it is too wet to cultivate. On the ridge section of the State, where the largest percentage of groves have been planted during the past fifteen years, rough lemon stock is used almost exclusively. One of the chief characteristics of that stock is to grow and force that characteristic on the bud that is put in. Of course, when ample fertilizer is supplied, a stock like that also produces large quantities of fruit, but at the same time the factor of coarseness is there in considerable force.

Now cultivation is also conducive to growth, so the combination of the stock effect on growth and of intensive cultivation necessarily results in growth. Incidentally, of course, it produces the volume of fruit but the growth tendencies in the stock, with the effect of the method

of treatment is evidenced in the fruit, as was indicated by the example noted by Mr. Lenfest in closing his paper.

I have seen cases like that, which of course some of us who grow fruit on sour stock claimed is the place to get quality, but even though I grow fruit on sour stock I know that good quality fruit can be produced on rough lemon stock by changing your methods a little.

The cultivation, or non-cultivation, or limited cultivation ideas have been threshed over in the apple belt of the North and Northeast, with very similar results. The quality of apples grown by the sod-mulch method is in many respects superior to fruit grown in an orchard that is cultivated during the first half of the summer and allowed to produce a cover crop the second half, but the size and volume of fruit of a certain size is in favor of part cultivation. So that perhaps the net returns to a grower, unless there is too much premium put on the color of apples, is greater on the partial cultivated orchard than on the sod mulch orchard.

In Florida we have a type of fruit—perhaps we could call it a type—that we name the Indian River quality, or Indian River fruit. We know that the Indian River fruit is grown under either non-cultivation conditions, or at least with limited cultivation. Of course, it is grown on richer land than is found on the highlands of Polk County, but the fact remains that even on that high land, similar fruit can be produced by changing the methods more to the kind used for the growing of Indian River fruit. It is necessary in those cases to pay more attention to the building up of the soil. The soil must be built up with organic matter, not only a high percentage organic matter in the fertilizer supply, but also by judicious working in of cover crops, and perhaps an occasional application of manure.

My experience in Florida, since 1912, has been interesting from that standpoint. When I first came here, it was considered criminal to put stable manure in a grove, and I knew personally a number of old growers who I believe would have met you with a shot gun at the gate if you had said that tomorrow you would put stable manure in his grove. That has changed, and now growers are paying quite appreciable sums per ton for stable manure, and they find that one application, even though light, is effective on those groves, over a period of several years, not only in maintaining normal trees, but in maintaining volume of yield, one year after another, and the yield effect is particularly noticeable on old seedling groves. There the effect seems to be especially marked.

Now there are quite a number of groves in Polk County during the past years—I don't know whether there are any now or not—that were cultivated to death probably the first four or five years of growing trees, so that by the end of the fourth or fifth year the soil was absolutely sterile, as far as being able to produce the cover crop is concerned. You go there in mid-summer, and there would be a few sickly sprouts of weeds or grass showing here and there. Those groves can be properly put in good normal condition by the use of stable manure, along with assistance of proper fertilization and reduction of cultivation.

I believe the idea Mr. Lenfest presented of going gradually from the intensive cultivation to the non-cultivation, or partial cultivation is a good idea, particularly on the high pine land. Work on your soil, get it in proper shape, and reduce your cultivation where you can.

In a general way, I believe a good transition practice, or perhaps an ultimate one, for high pine land, would be to start in the spring, fertilize your grove, and work in the fertilizer very thoroughly and discontinue cultivation for at least a month, and with a season such as we have at present, for a great deal longer time than that, perhaps until water shortage becomes marked. Then cultivate again. Of course, there will be grass there, and it may require more effort to do the work, and your grove won't look as clean and pretty as some of you want to see groves look, but after all you don't have the grove for looks; you have the grove for fruit production, and particularly a good quality fruit.

I want to cite a case here that I experienced this spring along in February, in Lake County. A man running a large grove had me there to advise him in regard to its treatment. It was an old seedling grove, with a small stock of eight-year-old Valencias. The fruit on the Valencias was of the variety that has a very pebbly and pimple-like appearance on the surface. The oil glands stood out very prominently. The fruit was not highly colored; it was greenish at the stem end. On cutting into the fruit you would find the pulp of it coarse, and some of them have dried-out cells at the stem end and the juice is rather indifferent in flavor. It is a grove on rough lemon stock that received intensive cultivation. A man who had a twenty-acre grove near by was working for this man, with the large grove, putting in practically all of his time there, and using only spare time to work his own grove. On leaving, I was asked to look over the man's grove working in this large grove, to see if I could help him. When we stopped in the grove this man said to me, "I am sorry this grove doesn't look better—I have to make a living working for the other man, and therefore my grove looks woolley; needle grass is still scattered throughout, and it doesn't suit me, but I can't do any better." I called him over to a tree. The trees were about nine years old. I said, "Feel of that fruit, and compare it with the fruit in the other grove." He said, "Well, it feels smoother," and I said, "Look at it, and you will see there is no green on it; it is absolutely full-colored." He said, "Yes." I said "It's also on rough lemon stock. Now you can see that you grew better fruit than your neighbor who had more time for cultivation, and if I were you I would cultivate no more the coming season than you did the last, and possibly a little bit less." He said, "The grove doesn't look good." I said, "No' the ground doesn't look good, but your trees look good; they have a heavy crop, and what's more they have a heavy bloom coming—just as heavy as you want."

Now another item that I wish to touch on slightly is the matter of fertilizing these groves in which you are reducing cultivation. We know that a portion of the fertilizer is used in tree growth and we know also that cultivation is conducive to tree growth, so by changing your grove to one of much less cultivation you

want to keep that in mind in regard to this fertilization. In instances where you used, say a 3-8-5 fertilizer on your grove, that you have been cultivating intensively in the spring and perhaps in summer, and possibly in fall, you use a 2-8-6 or a 2-8-10 and you get what you call fair quality fruit. With the reduction of cultivation you would necessarily have to increase the ammonia in your formula, or add more pounds per tree to the same sized trees, than you would with intensive cultivation. I am speaking of high pine lands and I might say trees on rough lemon stock, and it remains to be seen what the relative amount per tree, and what effect your excess cover crop is going to have on your growth. From the experience I have had I would say that most of you are applying pounds enough per tree to change to the less cultivation of your grove, and continue the same number of pounds.

There has been an idea abroad for a long time that to get quality fruit you necessarily have to use high potash. That idea was somewhat discredited when after two or three war years we could still grow as good quality as we had before, but in this connection I might mention that ordinarily a high potash will tend to retard the growing effect of the ammonia and of the formula, so that under intensive cultivation a high potash will give you less growth, and tend to retard the growth stimulant that you would get without the high potash.

Now with the change to less cultivation you probably can get along with less potash. What the minimum is, is hard to say. Probably during the war times it looks like it might be very low, but we can't say definitely what it may be. I have usually been advising from three per cent to five and six per cent of potash—comparatively low in the spring and higher in mid-summer and fall.

In addition to the rind quality, there is the quality of the juice that is important. In many groves the drying out of the fruit at the stem end corresponds with a certain condition of the juice that we say is insipid, or watery. According to my experience, the juice quality can be maintained better if in the fertilizer that you apply you use relatively a high per cent of ammonia, derived from nitrate of soda, as compared with ammonia derived from sulphate of ammonia. In fact, a dominant amount of sulphate of ammonia in the fertilizer, under most conditions, especially with intensive cultivation, usually leads to the production of fruit that is very insipid, and will meet the acid test before it is colored, and by the time it is colored, it dries out at the stem end. With the use of organic ammonia with sulphate, that effect is counteracted to quite an extent, but if you simply consider the inorganic portions of the ammonia, I say that to obtain the good quality juice, emphasize the nitrate portion of the inorganic ammonia.

One might also ask the question here—how are we going to maintain moisture in an old bearing grove without intensive cultivation on high pine lands, and it's a pertinent question. My answer is that probably in a very high percentage of cases, it would be profitable to install irrigation systems to supply the water during dry periods. Where it is impractical to do so, of course cultivation during droughts is necessary, or at least profit-

able to maintain the practice during the drought. Absolute omission of cultivation will probably lead (I have seen it do so) to a sparse foliage tree; that is, trees that have been heavily loaded with fruit and foliage must necessarily get rid of much of the foliage, and in cases much of the fruit, in order that there is a balance in the evaporation of the moisture and the supply from the ground.

Mr. Skinner: There is one institution in the State probably dearer to the Horticultural Society than any other one. We have manifested our interest in that institution many times, and we have relied upon that institution many times, and it has never failed us. I don't know as we can say that we have ever failed them. We have tried not to. We have tried to boost; we have tried to help them in the Legislature, and tried in every way possible, because in helping them we are helping ourselves. I don't suppose there is any institution that has grown with greater stride in recent years, that compares in growth and its usefulness—I refer to the *University of Florida* at Gainesville. It's an institution of which we are proud. I beg to introduce its President, Dr. A. A. Murphree, who will now address you.

The Agricultural College of the University of Florida and What it Offers to the Citrus Grower

Dr. A. A. Murphree, University of Florida, Gainesville

President Schurman, in his classic address before the National Association of State Universities, said, "A state university has the privilege and duty of serving the state. While its education is rigidly limited to educational, scholarly and scientific interests of the state, these interests are very extensive and very diversified. Therefore, a state university should not content itself with any object short of the entirety of the educational, scholarly, and scientific interests of the commonwealth. It has in this respect an advantage over the privately endowed university. The scope of the privately endowed university is narrower, its program less diversified, than that of the state university. It is in the state university that the scientific and intellectual interests of the community are reflected in their entirety. As these universities are dependent upon the people as a whole for their support they are sensitive to the intellectual needs of the people whenever and wherever they arise. There is no work, no calling, no human activity too humble for their consideration, if only science or knowledge can be of use in it. On the other hand as the people support the university, no section of the community will tolerate the neglect of its peculiar problems. Hence it is that state universities have such a multiplicity of departments and such a comprehensiveness of curricula, Their province is the totality of human knowledge and its application to the life and work and vocations of mankind. Agriculture is cultivated side by side with law and engineering, teacher training and arts and general science. The action and reaction of a university and the people of the state upon each other are mutually advantageous. Of course, the people are aided and abetted by knowledge, but it is also an advantage to the university to be kept in close touch with concrete scientific problems and with knowledge that is useful; the university is thereby saved from mere scholasticism and barrenness. It may be said that this work is utilitarian, but it should be noticed that the activity which the state universities exhibit in practical affairs, like farming and engineering, is itself a scholarly and rational activity. And I see no reason why facts concerning crops, stock, railroads and factories should not be as stimulating to pure reason as any other group of facts. Certainly Darwin, the greatest scientific speculator since Newton, took as the starting point of his theory, the data gathered by gardeners and stock breeders."

The attitude of our people toward their state university is extremely encouraging. It is also wise and far-sighted. The life of the state, like the life of the individual, is dependent upon foresight and foresight is the counterpart of that exact and systematic knowledge which we call science, of which the university is the organ and workshop. The best guides and chief helpers of the community are not the politicians or the financiers who fill the public eye but the scholars and the scientists. Universities are to the nation what eyes are to the animal. And since in our republic, the Federal Government does not undertake to found educational institutions, it devolves on the states to supply the universities. Their origin and support can no longer, in the United States, be left to caprice and uncertainty of private generosity, helpful as that generosity may be. Education from the primary school to the University is the concern of the state. All the states have recognized this obligation and provided state universities or state colleges of agriculture and mechanic arts.

What has Florida done to meet this obligation?

In 1905 the State combined all six institutions of higher learning into the University and the Woman's College to make it possible, with concentrated support, to develop a University and a Collegefor Women into institutions comparable to the higher educational institutions of other states and adequate to the needs of a rapidly growing commonwealth.

With this high purpose in view, and as a means of extending its benefits as widely as possible, the State University has organized its work along three distinct lines, namely: Resident instruction, investigation, and extension teaching and demonstration.

One necessary function of the University is to provide adequate means for the education of Florida young men. In order to carry out systematically this fundamental duty the work of resident instruction has been divided into the following groups: 1. The College of Arts and Sciences; 2. The College of Agriculture; 3. The College of Engineering; 4. The College of Law; 5. Teachers' College and Normal School; 6. The School of Pharmacy; 7. The Graduate School.

In addition to the resident instruction, there is a department of general university extension teaching. Its purpose is to give information and assistance in subjects other than agriculture and home economics. To the boy or girl unable to go to high school, or college, study by correspondence is provided. Though this department has been in operation less than five years fifteen thousand students have been enrolled in class and in individual correspondence study. Schools of civics and Americanization have been held; community surveys, educational moving picture films, bureau of general information, etc., have been established. Through the Extension service the University campus extends to every community of Florida.

1. The Arts and Science, or Liberal Arts College, includes the departments of Languages and Philosophy, English Language and Literature, History and Political Science, Economics and Sociology, Mathematics and General Science. The aim of this College is to establish a foun-

dation upon which to build technical and scientific education; to provide a basic preparation for business, law, medicine, journalism and to afford the opportunity for general cultivation and refinement of the mind.

2. The College of Agriculture conducts its work along three distinct lines:

a. The instruction in the College of Agriculture embraces two general divisions: Plant Industry and Animal Industry.

The Plant Industry division covers work of agronomy, horticulture, plant morphology, physiology, pathology and forestry and the related subjects of agricultural chemistry, fertilizers and agricultural bacteriology. The division of Animal Industry, dairy husbandry, poultry husbandry, farm management, animal pathology, veterinary medicine, entomology, etc.

The teaching of a rational, practical system of farming is the primary aim of the College of Agriculture. The courses of study are planned to give the student a general knowledge of all phases of agriculture and related sciences, but at the same time to afford an opportunity to specialize along the line in which he is particularly interested. The plan provides for those who wish to take up some professional line, such as teaching, research, county agent work, as well as farming.

b. The second division of the work of the College of Agriculture is investigation in the field of scientific agriculture in both theory and practice. The investigation of the projects now under consideration promise large practical returns to the farmers. While great practical results have already been achieved by the Experiment Station, there are yet innumerable agricultural problems that call for scientific study and research. The agricultural industry cannot afford to neglect agricultural research in these times when new methods in production, distribution and marketing are so important.

c. The third great division of work of the College of Agriculture is to carry the available information in agricultural science and home economics to farms and homemakers by practical demonstrations on their farms and in their homes. This work is conducted in co-operation with the United States Department of Agriculture and the State College for Women. The magnitude and far-reaching importance of this Agricultural Extension cannot be estimated. All sections of the state have come to realize the immense value of county agent work in promoting the development of agriculture and development of a more prosperous and happy rural life in the counties.

3. The University of Florida College of Engineering includes civil, chemical, electrical, and mechanical engineering. The engineering courses are arranged with a view to preparing the students for immediate usefulness in the technical world. This College is organized to instruct students who desire to practice engineering, as a profession; and, second, to teach students interested in agriculture and applied sciences such branches of mechanic arts and engineering as will promote their individual interests.

4. The College of Law has a three-year standard course of study. This col-

lege is one of the four standard law schools in the Southeast, and has been recognized as such by the New York Board of Regents and by the American Law School Association, of which it is a member. "This College aims to develop keen, efficient lawyers who will live up to the high ideals and traditions of the bench and bar of the country. Its work emphasizes practice as well as theory, pleading as well as historic perspective, skill in brief-making as well as legal information.

5. The Teachers' College and Normal School consists of an organization of the various activities of the University which are concerned with the professional preparation of teachers. Its courses are planned to serve four classes of students —first, those preparing for elementary and rural school service; second, prospective high school teachers and principals and school supervisors; third, those preparing to teach agricultural and industrial arts; fourth, those registered in other colleges who desire courses in education and psychology.

6. The School of Pharmacy was inaugurated with the opening of the session 1923-1924 of the University. The prime object of its organization was to offer superior opportunities to those who wish to train themselves thoroughly for the important duties of the retail pharmacist, the pharmaceutical chemist, or the professional or manufacturing pharmacist. The School of Pharmacy makes consistent endeavor to provide a well balanced course in pharmacy, chemistry and allied subjects that will fit students not only for the prescription counter and commercial pharmacy, but also for a great variety of professional positions in pharmaceutical chemistry as well. The training in pharmacy in this school is, moreover, especially valuable to a person desiring to engage in the manufacture of chemical or medical products.

7. Graduate or advanced work above that of college grade is offered to graduates of standard colleges who are qualified to undertake such work. The only advanced degree conferred at present is that of Master of Arts or Master of Science.

This is a mere outline of the organization and work which the University is attempting, with the means at hand, to meet the intellectual needs of the people.

What is the University undertaking to do for the citrus industry of Florida? It is trying to respond directly to the scientific and intellectual interests of the citrus growers through the three divisions of the Agricultural College.

1. Two hundred seventy-eight students out of 1,347 in the six colleges of the University, nearly one-third, are studying in the College of Agriculture. Of this number, 150 are taking the horticultural courses.

The basic citrus culture courses include general chemistry, agricultural chemistry, general botany, plant physiology, plant pathology, general bacteriology, agricultural bacteriology, entomology, plant propagation and pruning. The practical courses in horticulture embrace citrus culture, citrus harvesting, marketing and judging, advanced citrus problems, insects and diseases of citrus, etc.

To these courses, which include not only classroom exercises but a large portion of students' time in laboratory and

field experiments, there are added fundamental courses in study of soils, fertilizers, farm management and agricultural engineering. Farm engineering includes mechanics of farm implements and machinery and farm motors, and the study of drainage and irrigation.

If funds were available, and with consent of growers, instructors would take students to important citrus sections to study methods used by successful growers in all phases of citrus culture, beginning with the study of the soil, its preparation, cultivation, fertilization, cover crops, pruning, diseases and insects and their control, varieties, fruit, stocks used, etc., We should want these students to see the packing houses in operation, methods of harvesting, packing, shipping and selling. This is an important but neglected factor in the training of students at present. By means of instruction and training, the College of Agriculture is trying to turn into the citrus business technically trained men.

One of the most practical citrus men wrote me recently that trained men is the big demand in the citrus industry right now. He said:

"Our packing houses are fearfully run, for the simple reason that the managers, though practical, do not have the fundamentals, such as knowledge of what causes decay, etc. I am convinced of a great opportunity for young men with the proper training to grow oranges and other fruits in a better and less expensive manner than is done at the present time. Only a few growers are sufficiently informed about fertilizers, for instance; that is, what ingredients are necessary to mix in plant food to bring about the best results and at a minimum cost. A thorough knowledge about the best methods of preventing and controlling insect pests and diseases is likewise necessary to produce high quality fruit.

"I am convinced that the greatest opportunity in this industry for well trained men, that is technically trained men, is in the marketing end, as well as in packing house management. The pitiable condition of our marketing situation this past season has been brought about, to a very large extent, by this lack of well trained men. It is very doubtful if colleges and universities have furnished very many of present packing house managers. On the contrary, most of these men have learned the business from the ground up. They hoed the trees in Dad's grove, sprinkled fertilizer, cultivated up and down the rows, and have learned most of what they know from field observation alone. Now, had they received the fundamentals as given there in your Agricultural College, they would have something well worth while to add to their practical knowledge or training. It is true that these practical men know the difference between a bright orange and a fourth-grade russet, but very few of them know of the hundred and one little things which bring about the second, third and fourth grade fruit. Take the rust mite, for instance, which is responsible for sixty per cent of the low-grade fruits. While most growers know that lime-sulphur spray controls it, not one in fifty knows when to apply the remedy, that is, at a time when the pest is in the stage where it is possible to prevent discoloration and scarifying of fruit. Not one man in a hundred could draw a diagram describing just how this little insect

looks. It is only the technically trained man who can identify him. Likewise, it is only the technically trained man who knows when the crawler stage of the purple scale can best be affected or killed by dusting or applying spraying solution.

"There is no occasion, of course, to cast any reflections upon any manager at the present time, but the idea is that there is a great need for managers who have this technical training. The elimination of decay is something which can be brought about by men who know the causes.

"Here is a fact worthy of note: All men from agricultural colleges, are picked up just as soon as they are leaving school by large concerns such as big fertilizer companies, our county agent organizations, the big developments, and other agricultural workers organized on a large basis. Why, the railroads take up numbers of these trained men, but still the demand far exceeds the supply."

This is a convincing argument for agricultural college training. The University craves enlarged room, increased laboratory facilities, and more instructors, required to meet more adequately the increasing demand of technically trained men for the farm and groves of Florida.

2. As to problems the Station is investigating for the citrus industry, I will quote from the departments of chemistry, entomology and plant pathology:

a. The Department of Chemistry—"At Lake Alfred we are conducting three fertilizer experiments, one to determine the relative merits of the various sources of phosphoric acid for orange and grapefruit trees. This experiment is conducted at Lake Alfred but not on the Station grounds. On the Citrus Station grounds we are conducting an experiment to determine the effect of high vs. low potash content on the quality of the oranges and grapefruit. In the second experiment we are testing out various forms of ammonia on the growth, development, yield and quality of oranges, grapefruit and tangerines. We are also, in this experiment, endeavoring to determine whether or not any special source of ammonia has a tendency to produce Dieback.

"On the East Coast of Florida, at Vero, we are conducting an experiment to determine whether or not muriate of potash can replace sulphate of potash as a source of potash for citrus trees, either entirely or in part.

"Practically all of these experiments have been running such a short time that we cannot as yet draw any conclusions. The phosphate experiment is an exception and a report was made before the Horticultural Society last year, on the first five years' results. To date no marked changes have been noticed and we cannot state that any one source of phosphoric acid is superior to another.

"Here at Gainesville we are making a study of the citrus disease, Dieback.

"In addition to the above, we have also recently begun two experiments on the Satsuma orange in West Florida, one at Round Lake and the other at Panama City. In these experiments we are endeavoring to determine the best times of application of the fertilizers and the optimum amount of ammonia which can be used. We hope, before the end of the year, to be able to further extend the experiments with Satsumas to other sections of the state."

b. "In the department of entomology we have been carrying on several lines of work. One has been that of determining just how much injury the common flower thrips does to citrus and of determining just how practicable it is to try to control this insect by spraying, best sprays, etc.

"We are also constantly on the watch for beneficial insects to import into Florida which may help us to keep down citrus Australian lady beetle, which has saved the citrus industry from the cottony cushion scale which undoubtedly would have destroyed it. We have introduced a parasite of the mealy bug which seems to be doing efficient work in keeping down that pest, and also a beetle which we hope will give some benefit in combatting whitefly.

"This spring considerable time is being given to find the best means of checking plant lice or aphids which have been unusually abundant on citrus the last two years.

"We are also, in co-operation with the department of plant pathology, endeavoring to find a method of combatting melanose and scab which will not result in an undue increase in scale insects on the trees."

c. "The biggest project which the department of plant pathology has on hand at the present time is, of course, the citrus canker investigation. While in the past citrus canker has been apparently eradicated from the state, still we feel that we should know more of the habits of the bacterium so that if it should appear again we would have more definite information as regards its control. The work engaged in at the present time is studying the life history of this organism, finding out whether or not this bacterium can spend part of its life as a saprophyte and then adapt itself to the host and become a severe parasite.

"Our next project is that which deals with the fungus, *Phomopsis Citri,* Fawcett. This fungus is responsible for two diseases and may, under certain conditions, cause a third. Melanose and Stem End Rot are diseases of the citrus fruits caused by this fungus. We are at the present time trying various sprays for the control of this fungus. We have been very successful in combatting the Melanose and we believe that if we can control Melanose that we will be able, at the same time, to control Stem End Rot, for if the fungus can be eradicated from our groves, Stem End Rot cannot occur. In just the proportionate extent that we can exclude this fungus from our groves we will mitigate the loss due to Stem End Rot. We have also noticed that this fungus, at times, can cause a severe Gummosis of the trees, in fact, a severe wilting of the leaves and a dying back of the trees which suggests the disease described as Withertip. Only this past winter a severe outbreak of what appeared to be withertip appeared on the East Coast and an examination of this disease disclosed the fact that this disease is, wholly or in part, caused by *Phomopsis Citri.*

"There is considerable loss of fruit which takes place during the process of marketing. Many years this loss equals ten to fifteen per cent of our total crop. The decay in transit is largely due to Blue Mold. We have a project on hand to control Blue Mold decay. This con-

trol is brought about by careful handling, picking and packing.

"Another disease which causes considerable loss is that known as Citrus Scab. This disease attacks the foliage of the young sour oranges and so weakens them that their value as stock is greatly reduced. Spraying experiments have been carried on and show that this disease can easily be controlled in the nursery by a proper use of Bordeaux mixture. This disease also causes many of the grapefruit to become culls. If the proper spray is applied shortly after the blooming period the ravages of the disease are reduced to a minimum.

"Citrus Blight, which occurs all over the state, but is worst on the West Coast is being investigated by a man stationed right in the locality where the Blight is the worst. This disease takes an annual toll from many of the groves of one to ten per cent of the bearing trees. One can readily see that if we value a tree at $100.00 what a loss occurs in the large groves where ten per cent of the trees are cut out. This laboratory has been established recently at Cocoa by the aid of the growers themselves furnishing part of the money."

3. In the third place, the University Agricultural College helps the citrus industry through the Agricultural Extension Service.

"Since 1914 the county agents of South Florida have been giving special attention to citrus culture. Before that time it seemed a little aside from their real activities. The first citrus extension work began in DeSoto County when the county agent was active in the control of foot-rot and insects in groves. With assistance from the Experiment Station this was made a special project and during 1914 a number of properties received attention from county agents in DeSoto County. About 1916 Mr. Wm. Gomme, then of Lake County, in co-operation with the Florida Experiment Station, conducted work in the control of gummosis and lemon scab, acting on the recommendations of Mr. H. E. Stevens, then Plant Pathologist. In the same year Mr. Alfred Warren, County Agent, Ft. Pierce, became active with citrus properties and turned his attention very largely to the care and management of young groves planted on drained lands. During 1918 the successive years in county agents in every citrus county have taken an active part in grove management and grove problems, principally in the control of insects by proper spraying methods. In 1922, in co-operation with the Plant Pathology Division of the Experiment Station, much interest was aroused in the control of melanose, especially in Lake, Orange, Polk and Manatee Counties. This was continued through 1923 and the importance of the work was recognized so that on the recommendation of Director Newell, Mr. E. F. DeBusk was appointed as Citrus Pathologist in the extension work and he has given his time very largely to demonstrations for the control of melanose. This work involves the closest co-operation between investigational and extension workers. It is the policy of the Extension Division to rely on the Experiment Station for subject matter. The Extension Division is the only means of carrying this subject matter on scientific problems to the growers and having it

properly applied under supervision. Since 1921 there has been a specialist in Entomology and Plant Pathology, who divides his time between citrus and truck crops. His work is to assist county agents, citrus growers and truckers in the best practices in disease and insect control.

"With the great increase in citrus acreages and because of the large amount that has been spent in Florida for developing grove properties, much of the county agents' time has been taken up with advice to newcomers. Such advice as selection of lands, varieties and stocks and planting and care of young groves has involved a service that is far reaching. This service has been worth several times its cost. It has enabled inexperienced citrus growers, mostly from distant states, to handle their properties under the very best known cultural methods.

"The Extension Service has been equally active in the promotion of the vegetable industry of Florida. In the Hastings section growers have been assisted in the control of blight. In the Sanford area the growers have received assistance in insect control, fertilizer recommendations and in marketing problems. In Manatee County the county agent has been active in the control of nail-head rust. In Hillsboro County the agent has given definite assistance in the fertilization and management of the strawberry crop. On the lower East Coast the tomato growers have been assisted in the control of the land crab and in the control of nail-head rust. In the cucumber area the work has been in the control of diseases that are destructive to the cucumber crop. In the watermelon areas direct attention has been given to spraying with Bordeaux mixture for the control of anthracnose and the application of Bordeaux paste for the control of stem-end rot.

"In counties where this type of work has been in progress growers recognize the need of well trained men for extension service. It has been the policy of the Extension Service to secure the best trained men for such places, having in view their qualifications for the particular work that they should undertake."

While the University is under the mandate of the State to care for a wide range of work, more than half of its resources are devoted to the promotion of agriculture in its various phases. From what has been said above, no one will question that the citrus industry in Florida is in any sense being neglected except in so far as limited funds and other resources of the University College of Agriculture circumscribe the activities of the Institution.

Mr. Skinner: I am sure we all realize that we have a real University and a real University President, and we thank Dr. Murphree for his address.

The Marketing of Fruit with Reference to Quality

Bruce Floyd, Orlando, Fla.

With all that has been said during the past year with respect to marketing problems, it is rather strange that this basic trouble has not been more generally discussed. It is therefore a pleasure to be able to present some facts and recommendations to the members of the Horticultural Society on this subject.

Since the beginning of time, great rewards have come to those who produced an article superior to the average, and the situation with respect to Citrus fruit is no exception to this general rule. Indeed, a study of any auction sheet clearly indicates that while one grower is receiving little or nothing for his fruit, another grower is receiving most satisfactory returns. Soil and climatic conditions have much to do with this situation, and I am not here to say that growing methods can be revolutionized to the extent that all of the fruit produced will be of fancy quality, however, I do say that many growers will find the production of Citrus fruits unprofitable, unless steps are taken to improve their product to the extent which may be possible, soil, root stock and climatic conditions being considered.

The rapid increase in production is a matter so well known that the quoting of figures indicating our yearly increases is entirely unnecessary. Not until this present season, however, has it been possible for many growers to fully realize the differential existing in prices. This by reason of the fact that in former years even the low grade fruit has shown a profit to the growers. With price levels this year averaging a dollar lower than those prevailing during the preceding year, the producers of low quality fruit have been forced to see this differential, as much fruit of such quality has been sold in the markets for less than freight and packing, despite the fact that vast quantities have been discarded in the groves and in the packing houses.

I believe that many growers honestly consider their product of superior quality when, as a matter of fact, their fruit is not so judged by expert packers, or by the trade. Many growers who admit that the texture of their fruit is poor, still proudly claim that it is "Sweet." Right here, I wish to state that fruit is sold on its appearance. It is bought by a public educated to judge commodities by their eyes, and we cannot possibly hope to build up a sufficiently strong demand for Florida fruit simply on the basis of its flavor.

Fruit serves two purposes: First, as

a food or drink; second, as an ornament. That which meets the demands of both, and is a food and an ornament has, and always will command a price which will show a profit over the cost of production. That which will serve only as a food has, and will contiue to be much less profitable, and in many cases will prove absolutely unprofitable to the producers. When the differential in New York market reaches the point (as it did on April 11th) that one line of grapefruit sells for $7.00 and another line sells for 50 cents, there is certainly sufficient incentive to the growers to do any and everything within their power to get out of the 50-cent class and as near the $7.00 class as they possibly can.

Were Florida the only producer of Citrus fruits it might be a relatively easy matter for us to educate the public to the point that they would not expect the exterior appearance of Florida fruit to be attractive. Coming into competition with approximately twenty-five million boxes of California Citrus fruit of better appearance, the odds are against us despite our vastly better flavor, and juiciness, on low grades of fruit.

Melanose, which I consider our greatest pest, from the standpoint of detraction in appearance, and texture, is on the increase. In addition, this fungus is perhaps responsible for as much decay as any other single factor. Growers have not yet been successful in combatting this with spray, without inviting scale and mealy bug, and further damage will no doubt continue in proportion to the age of the trees and the amount of dead wood in them to harbor this pest, until some more successful spray mixture is devised.

Next in order, comes rust mite and scab. Scabby fruit usually goes to the cull pile without exception, and is consequently a total loss to the grower. Rusty fruit, while selling for considerably less than bright fruit throughout the season, is otherwise not so serious a factor since we do not find that rust is harmful to the carrying quality of fruit. It is interesting here to consider the fact that growers who have sprayed most consistently through the summer months, and who have until Christmas time, a heavy percentage of brights, frequently relax in their efforts and allow their crops to become rusty during January and February. Our own shipments until Christmas of this year averaged as follows:

Brights, 37.2 per cent.
Goldens, 52.3 per cent.
Russets, 10.5 per cent.

Since Christmas this percentage has changed to the extent that our shipments since that date have averaged as follows:

Brights, 30.8 per cent—a decrease of 6.4 per cent as compared with before Christmas.

Goldens, 47.3 per cent—a decrease of 5.0 per cent as compared with before Christmas.

Russets, 21.9 per cent—an increase of 11.4 per cent as compared with before Christmas.

It may be of interest to know that of our total volume, 68 per cent has graded Blue Goose, the remainder being distributed between second and third grades.

Not all of this difference is attributable to rust mite, however, a sufficiently large proportion is traceable to rust mite, and I trust that this matter will have the

consideration of all growers present. Don't relax until your fruit is harvested.

Contemplating these matters strictly from the standpoint of a marketing agency, and considering first, grapefruit, I wish to say that primarily a "Fancy" grapefruit is oblate, smooth of texture and bright. Without doubt, the greatest single factor militating against the profitable production of grapefruit is oblong, thick-skinned fruit. I cannot blame the consuming public for failure to absorb at satisfactory prices much of the pointed and unattractive grapefruit which we produce. To begin with, such grapefruit is most unattractive in appearance, and in the second place, the edible portion of such fruit is not at all in keeping with the size of the exterior. In serving the stem-end of such fruit it is necessary for the housekeepers and restaurants to cut off an inch of this elongated skin in order that such grapefruit will rest upon a plate without rolling over. By reason of its large surface, anything which detracts from the appearance of Citrus fruit appears most pronounced on grapefruit. It is, therefore, doubly necessary to maintain the oblate shape and smooth texture of this commodity in order to further increase its sale.

There are many growers who ponder over the discounts which apply on large sized grapefruit after January. There is nothing strange about this when the high freight rates to Western points are considered and the consequent additional cost per fruit to the customer is compared with the similar cost per fruit of smaller sized grapefruit. Had all of the grapefruit from the groves been packed since the first of February, considerably more than half of it would have been manifested as 36s, 46s and 54s. This condition causes 64, 70 and 80 size to be in strongest demand, and such sizes naturally bring a decided premium.

We are carrying our grapefruit on the trees for a much longer time than was the case five years ago. Not enough regard is given to the matter of spot picking large sizes before such fruit is discounted and growers for the past several years have found themselves with unsalable fruit late in the season, which might have earlier in the season, been turned into a profit. Spot picking, together with the muchly needed reduction in freight rates will do much to solve this situation with regard to sizes. Florida has a virtual monopoly on the grapefruit business, and a distribution much wider than is the case with oranges. It is, therefore, doubly necessary to raise grapefruit which will be sufficiently attractive to the trade, and to the consuming public, to allow for its still broader distribution and consumption to the extent that it will truly be the Nation's breakfast food.

I am not at all pessimistic over the outcome of grapefruit and believe that grapefruit of good quality will, in the future prove as profitable to the growers as oranges. Marsh Seedless is our best grapefruit, and were the thousands of acres of new grapefruit groves planted to this variety and on sour root stock, I would feel still more inclined to believe in the positive success of this commodity.

The marketing of Florida oranges continues to be confined to the area roughly described as east of the Mississippi River. Perishability of our Seedling oranges,

high freight rates, and the firm hold which California has maintained on the West will perhaps continue to make the North and East our largest consumers. The South has not bought a satisfactory quantity of packed oranges during the present season and will not do so as long as bulk fruit can be delivered at a little over one-half the cost of packed fruit. Practically all fruit shippers have made shipments of bulk oranges to the Southern markets. Such fruit is usually of unattractive appearance and has been shipped unpacked for the reason that the more critical markets would not pay a price justifying its packing. The shipping of bulk fruit is not a good practice, inasmuch as it tends to lower price levels to the point that boxed fruit cannot be sold in competition. We cannot ship all of our fruit in bulk and the shipping of any appreciable quantity in this manner is, in my judgment, a bad practice in view of this tendency to lower general price levels. Better appearing fruit does not have to be shipped in this manner and this situation is only another reason for producing a finer quality of oranges. Our great competitor, California, with its yearly volume of fifty thousand cars, offers an orange which is bright and free from melanose. Our oranges, containing fifty per cent more juice, have frequently sold at considerably lower prices. However, when the appearance of Florida fruit equals that of California fruit, jobbers and consumers alike are willing to pay considerably more for it. To this extent are we penalized because of the appearance of our Florida oranges. Another factor militating against generally better results is the perishability of Florida oranges, a curse which their superior juiciness carries with it. Only on Pineapples and Valencias do I recommend an aggressive sales program in the West, as our Parson Browns are not sufficiently fine in texture and our Seedlings do not hold up long enough to meet the demands of a trade accustomed to California varieties.

It is to be regretted that the State of Florida did not long ago recognize the fact that a relatively few, rather than an excessively large number of varieties, would have proven more profitable. As an early shipper, the muchly maligned Parson Brown is still the standard orange. As a mid-season orange, the Pineapple certainly has no rival, and the Valencia or Hart's Late is the only successful late producer. Were we shipping only these three varieties, our product would be more or less standardized and the trade would know better what to expect. California has been more far sighted than we, and is now producing, in quantity, only two varieties; the Navel and the Valencia. I confess that many of our mid-season oranges, such as the Jaffa, the Ruby and St. Michael Bloods, and others, are good varieties, but the marketing agencies and the growers themselves would be in much stronger position with Pineapples in their places. As the Seedling orange trees begin to die out, or become unprofitable the growers are going to be faced with the necessity for re-planting. I hope that the Pineapple orange will be used to supplant the old Seedlings.

Tangerines are next in point of production. With the damage sustained by the satsuma growers in Alabama, this

past winter, we may hope for better market conditions to exist on this commodity before Christmas. Easy to peel and of a wonderful flavor which appeals to old and young alike, I feel that we have only scratched the surface in tangerine distribution. From a sales standpoint, there are only two complaints to be registered against this fruit; lack of large sizes before Christmas and dryness after the first of February. Tangerines are remarkably good carriers, when the thinness of the skin is considered, and tangerines can be shipped for a longer period of time than is now customary, provided growers will plant more of this stock on sour root and fertilize it in such a manner that the fruit may be held until February or later. Even during this year of depressed prices, tangerines sold during February and March at amazingly high figures; $10.00 to $12.00 delivered in the markets not being an uncommon occurrence. Growers and shippers should recognize the necessity for spot picking tangerines, it being my belief that this fruit should be picked over from three to five times. In this manner the large sizes may be selected early in the season. This would result in more desirable sizes going forward to the markets and would also lengthen our shipping season. Tangerines on lemon root should be carefully watched and removed from the trees before dryness develops. Even to a greater extent than grapefruit, tangerines are strictly a Florida commodity. This fruit has never been really introduced into the West and I am most optimistic over its future, provided it is rightly handled and the dry fruit is carefully culled.

In a broad way, some comments may be made which apply to all commodities. No fruit is good until matured and immature fruit is recognized as a most harmful factor to our great industry. We have started the past several seasons with heavy shipments of immature oranges and grapefruit and to a lesser degree, tangerines. The pre-coloring of fruit is a harmful practice only when it is abused, and under some conditions is no doubt beneficial to the carrying quality, and appearance. This improvement in carrying quality is attained only by removal of the stems, and such unbuttoned fruit, while frequently looked upon with disfavor by the trade, will nevertheless be overlooked when the practice of pre-coloring immature fruit is stopped and when the trade recognizes gassing as a factor helpful to the sound arrival of fruit. At the present time the trade is thoroughly disgusted with pre-colored immature fruit, shipped during the early part of each season. A million boxes or more of unfit fruit were so gassed during last October and November. Aside from the fact that this sour fruit had a most harmful influence on our later shipments, the pre-coloring process allowed the shippers of the State to move fruit in quantities without precedent and entirely in excess of what the country could consume. The net result was that this surplus stock went to the warehouses and was later offered to the trade, not only unfit for consumption from the standpoint of maturity, but in addition, showing decay.

I maintain that our shipping season should be stretched over the longest possible time consistent with the actual ma-

turity of fruit. Fruit should not be moved until it will pass the Federal standards of eight to one on oranges, and seven to one on grapefruit, neither should it be held on the trees in the spring until it becomes dry or the seeds have sprouted. If there is a business in this world which demands honesty for its own salvation, our fruit business is certainly that one. Only by carefully standardized grading can we hope to attain the success which confidence brings and shippers are meeting with success only in direct proportion to the honesty of their grading and packing practices. We are selling to fruit experts and they in turn are selling our commodities to an increasingly critical consuming public. Most of our problems can be solved in the groves and in the packing houses. The other problems will likewise be solved when the shippers and shipping organizations, from the smallest to the largest, realize the absolute necessity for standardization in packing and marketing practices. This will come about through sheer force of necessity and those who are last to recognize this fact will be first to fail. Rigid Government inspection will no doubt prove very beneficial and is now becoming quite generally adopted.

In conclusion, I wish to say that the marketing of good fruit carefully graded and packed, is a stable business, and for such fruit marketing agencies find a ready sale. Inferior fruit is becoming an increasing burden, not only to the marketing agencies, but to the packers themselves. Fine quality fruit is profitable; poor fruit has not been profitable this year, and may not be in future years, yet each poor fruit shipped displaces the demand for a good fruit. Do your utmost to produce better quality, see that the packing house which handles your commodity is handling it in the best possible manner, plant only standard varieties, do not market your fruit before it is mature or after it is dry, and the stability of this great business is assured.

Mr. Skinner: Any questions on fruit production, or quality of fruit?

Mr. Drew: I noticed a year or two ago, in the Citrus Leaf, a statement that I have been thinking about. In those groves where during the spring months the harrow was kept constantly going, so that no vegetation started to grow, and then were turned loose when the rains came, they had a very much better cover crop than where the vegetation was allowed to start, and then was killed off by cultivation methods. I would like to ask him how he harmonized that point of view with the view at the present day.

Mr. Grossenbacher: I presume that that cannot be fully harmonized. In the first place, however, I have noticed this —that groves that have not had intensive cultivation usually develop a good cover crop, even though you kill out the crop of grass and weeds every time you cultivate. The statement made at that time in regard to continued cultivation had reference more particularly, however, to the practice of continued cultivation, as occurs generally in Polk County, and other high pine land sections, where in many cases they had gotten to the point of being unable to produce a good cover

crop on the land. Irregular cultivation, or cutting down cultivation does not lead to the depletion of the land to a point where a cover crop can't grow, and I have not seen a case where irregular or a small amount of cultivation was practiced that when allowed to grow there was not a good cover crop following. It doesn't harmonize the two at all, but one statement with reference to the intensive practice, to endeavor to save the grass seed and keep them from germinating.

Mr. Hart: I have noticed in my practice that the best time to finish cultivating, is just before the rains commence in the summer. I can't always tell exactly when, but I guess at it pretty closely.

Member: Mr. Floyd emphasized so distinctly the advantage of the Pineapple orange. Even the very best of us, and the ones most interested know so little about orange culture. We are all in the dark about certain things. I want to call attention to the variety of orange known as the Homosassa as a mid-winter fruit. It's one of the best tasting oranges; it's one of the best colored oranges, and one that ripens about the first of December. Pineapple is the best fancy fruit that we have, I will admit, but the Homosassa is a little rougher skin, a little thicker and a little better. As an eating orange and a shipping orange it is regarded as one of the finest varieties of orange. In my own grove I think I have perhaps twenty-five per cent of the Homosassa. It is one of the most satisfactory oranges I have to ship. I am quite agreeing with the speaker that we have absolutely too many varieties. I would like to hear of the Lue Gim Gong.

Mr. Skinner: I will ask Mr. Robinson to say something about this variety.

Mr. Robinson: I think the Lue Gim Gong is a very good orange, but personally I think the Valencia is better. I don't find many growers that disagree with that.

Mr. Drew: There is one other thing on this emphasis of the Pineapple orange. We are having trouble on the high lands of Polk County—some of us at least, and I am one of them—with the Pineapple orange. After the trees become thoroughly matured, they are difficult to keep in vigor. I remember our President here once saying, "We have got to get away from the Pineapple orange on that type of land." I have heard him and seen him correct statements that seemed to be rather opposite from that. I don't know what his present view is, but I am having trouble in my grove, which unfortunately is on rough lemon root, with the Pineapple orange, after the trees have gotten to be some sixteen or seventeen years old. The trees have a very strong tendency to go back. I can correct that by the liberal use of stable manure to some extent, but that correction is temporary.

Mr. Skinner: I would like to hear from Mr. Thompson. Mr. Thompson said you didn't have any trouble with the Pineapple Orange in that county, and I had another friend who was rebudding or resetting the Homosassa on that very ground. I have often heard the complaint that the Pineapple on lemon root, on high land, after it reaches full maturity will lose its vigor. I wrote quite a number of people trying to check up on it, and I think fully as

many said it didn't lose its vigor, as that it did. Perhaps those who said it didn't, didn't know.

Mr. Poole: There are Pineapples and there are Pineapples. There are so many strains under the head of pineapple that it is pretty hard to tell whether a man is talking about Pineapple or something else. I think a great deal of trouble with Pineapples on our high pine land is due to the fact that the nurseries, not intentionally, have sold pineapples that really are not pineapples, or an inferior strain which are not giving good results, but the brick red pineapple is doing well.

Mr. Skinner: In the Bishop—Hoyt Grove, a good many years ago, I ate fruit off the original trees, when Mr. Stevens was running the grove. My buds came from those trees by way of Blanton, where Mr. Lipsey got his buds from the original tree. I also got another strain from Homeland, in Polk County, and they are not the same orange at all—absolutely different. I also got another strain from a gentleman in Pinellas County, and that is not the same orange either, but the real genuine original Pineapple came from Citra, from one single tree in that section.

Value of Point of Origin Inspection on Fruits and Vegetables

Robt. Bier, Bureau of Agricultural Economics, U. S. D. A., Washington, D. C.

Inspection of fruits and vegetables at shipping point is not a new idea. A number of states have had quarantine, nursery or other forms of inspection for some years. This service has been largely of a mandatory nature and the inspector has been looked upon all too often as a policeman.

Co-operative organizations, large shippers, and growers have inspection or field organization of their own. Many of these services are performing very good work. The principal criticism raised against this type of service is that the inspector is either unduly influenced in passing judgment on lots of fruits and vegetables by his financial interest in the product or too often by his fear of displeasing some officer or large grower in the organization in which he is employed. Again, the average field man who is supposed to act as an inspector has to devote too much of his time in the performance of other services.

Congress in 1917 passed the Foods Products Inspection Law giving the Secretary of Agriculture through duly licensed employees authority to make inspections covering quality, condition and grade of fruits and vegetables in the terminal markets. This legislation has given to the shippers and growers in thirty large cities and others that can be conveniently reached therefrom an agency that issues a certificate showing condition and quality of the product. This service in the technical markets has been very helpful in lessening the number of unjustifiable rejections.

Better shippers, however, were dissatisfied because they preferred to know these facts before the car left their loading point. In July, 1922, by a change in the wording of the law, the Secretary was authorized to initiate the service at point of origin on all fruits and vegetables offered for interstate shipment. This law is purely voluntary, the shipper having to make direct application for same. To give the shippers in the different states this service a co-operative agreement had to be arranged with the Department of Agriculture or Marketing Bureau of the individual State. In this State such an agreement has been arranged with the Florida State Marketing Bureau. All certificates issued are joint federal and state documents and are accepted by all Courts of the United States as prima facie evidence.

Naturally, the introduction of such a service would be rather slow but it is

remarkable to note that in the first fiscal year of its operation 72,466 cars of fruits and vegetables were inspected in twenty-two states while in the first half of this fiscal year 78,386 inspections were made in twenty-nine states. These figures indicate that there must be an actual need for this type of service. California will doubtless have inspected a total of 45,000 cars alone by the end of this fiscal year.

It is interesting to study some of the advantages that have arisen as a result of this service:

Better grading and a better standardized product has been promoted. Instead of the principle that this is the best in the district there has now come into many of the producing sections the packing to a standard, preferably Federal. The standard serves as a measuring stick. Some seasons most of the product will pack out under the No. 1 Grade, while other seasons, because of unfavorable weather conditions it may be impossible to ship anything that would grade.

Again, the shipper should not lose sight of the fact that the fruit and vegetable industry is national in its scope and that markets to which he is shipping are receiving similar products from competing sections. These sections may not be injured and their product be of high quality easily meeting the Federal Standard. It is important that you have some way of evaluating the product from these competing sections. Federal grades give you a method by which such evaluations may be made. Combine this with inspection at point of origin when the certificate issued is an unbiased and unprejudiced report, and you create confidence that naturally makes for better merchandising of the product.

It is a strong advertising point. Today, practically the whole meat industry as far as it concerns the preparation of this product by the large packer is under government inspection and accepted by the consumer as a matter of course. You hear very little complaint from the consumer or the trade of diseased hams or old meat. This does not apply to the citrus industry of Florida. Hardly a paper or an article covering citrus problems but does not mention the green fruit question. Suppose all fruit next fall was government inspected voluntarily, mind you, and these facts were advertised to the trade that hereafter buyers would be supplied with a certificate showing the acid test and such other facts as the industry deemed the receiver should know. I believe such action would go a long way toward solving the green fruit problem.

Advertising has changed our buying habits today. There was a time not many years ago when you bought clothing just as a suit of clothes. Now you mention a national brand. Why? Just because your experience with trade marked and national branded articles has almost invariably given you a high grade product.

The fruit and vegetable industry cannot be handled, however, in quite the same way. You have a large group of producers, say of citrus in California and in Florida. In addition, Texas is developing a fairly large area. You say we have brands. Yes, that is true, but unfortunately, these brands are too often packed on the principle that this is the best we have; therefore, it goes under the best brand. Brands represent a name, a

section, or an individuality. Unfortunately, you sell to a large number of buyers and they may never have had your brand. They have no definite assurance of its being any specific quality. Merely being one of a large group makes it impossible for you to formulate a grade that will ever be used as a basis in settlement of a dispute. The Northwestern Boxed Apple Industry, the Peach industry have realized this weakness of brands. The result has been an adoption of grades as a basis of brands in these industries, and instead of the Citrus industry being the leader in standardization, the boxed apple and peach shippers now have this honor. These grades, however, represent minimum requirements. Any shipper is at liberty to add to his pack a more attractive wrap, a highly lithographed label, a neat box, a tight pack, etc. The receiver, however, is protected in that he soon realizes that he does obtain a fairly definite quality of product when he buys under such grades. If the shipper holds his trade it is then because he gives a more efficient service to the buyer.

Inspection certificates assist in forcing acceptance of shipments which are up to grade. In no industry is the problem of adjustments and rejections more serious. Too often, the shipper has found his F. O. B. profits later showing, when car was finally settled, on the red ink side of the ledger. With an inspection certificate showing product meeting a definite grade and in addition the sale specifically showing such grade as accepted by the receiver, the shipper has a clear case on which to force acceptance. That certificates are being used in this way is evidenced by the reinspections at terminal markets. During the first fiscal year out of the 72,466 cars only 61 were reinspected at terminal markets. Of these, 34 were reversed and 27 sustained. This indicates that the receivers were on the whole fairly well satisfied with the delivery of cars inspected at point of origin. Reinspection is allowed any receiver who will put up $12.00 with the understanding that if the grade is sustained he pays and if reversed his fee is returned to him. This reinspection acts as a check on the shipping point inspection and at the same time makes the receiver feel that he has an opportunity to obtain a fair deal if inspection at shipping point proved inefficient or lax.

Shipping-point certificates together with receiving-point certificates supply valuable evidence for use in adjusting claims with the railroad. Not only does the certificate give facts covering condition, quality, and grade of product but the condition of the load itself showing bracing, stripping, or other precautions that shipper has taken to prevent the load from shifting. In addition, where the product is loaded into a refrigerator car those points are noted upon the certificate that make for good refrigeration. This is what the shipper purchases when he uses such a car and it is important that cars that are loaded with a highly perishable product should have close fitting plugs, and doors, rack on floor, drain pipes open so water can escape from drip pans and the insulation surface unbroken.

An inspection service gives to the honest traffic manager, shipper and grower an unbiased document valuable to all in arriving at a fair and equitable basis on which to adjust claims. There is no

doubt in the minds of progressive shippers and receivers, and railroad claim officials that the whole problem of settling claims should be placed on a basis where they can be settled upon the real merits of each individual case instead as at present like a horse trade, each doubting the evidence of the other. Claims are costly to everyone. Inspection at point of origin tends to lessen and almost eliminate the question of claims because fundamentally many claims start before the product is even loaded into the car. When the shipper has taken all precautions in packing, grading and loading he has certainly minimized the possibilities of a claim ever being presented. If a claim is presented, it must be because of negligence on the part of the common carrier in hauling the product. In this case it is doubtful if any fair railroad claim agent would refuse settlement to shipper if he held a government certificate showing high quality of his products and the precautions he took in loading same into the car.

The most difficult problem of co-operative organizations centers around a fair and just evaluation of each member's product. Doubtless, a great many co-operatives have found this the rock on which their good ship has foundered. Here again, inspection at point of origin steps in and performs a very useful function. The certificate shows the grade, condition, quality, and size. These facts with the manifest of the car gives all the necessary information that a co-operative needs in pooling their product. Last season, the Sandhill Peach Growers' Association at Aberdeen used the Federal State inspection certificates as a basis for pooling. It was so successful that they plan to use it again this season. They found that the Federal State Inspection Service was being applied to all growers alike. They found the same system, same method of interpretation being made no matter what inspector looked at their peaches. This season, practically every car of peaches loaded in that section of North Carolina will be subject to Federal-State inspection.

There are other advantages but it all comes back basically to a desire on the part of the shipper and grower to give a definite value to the buyer and an assurance on the part of the buyer that this value has actually been loaded in the car. An inspection service that cannot arrive at the facts fairly, picture them concisely, and at all times be just has no reason for existence. The Federal-State Inspection Service is built upon this basis and should have the hearty support of all Florida shippers and growers.

Co-operation Between the Fruit Grower and Packing House Manager

Harold Crews, Tampa, Fla.

When a grower contracts with a marketing agency to sell his fruit and arrangements are made to pack it through one of their packing houses, then the grower and the packing house manager have one common interest; to so prepare and present the fruit to the agency's sales department that it can demand of the trade the highest price the market is able to pay on that quality and size fruit at the time it is offered for sale. To do this, complete co-operation is necessary between grower and packing house manager, and unless they work together to deliver the fruit to the sales force at such time and in such manner as the sales agency deems advisable, they cannot expect to get the best results market conditions afford.

The grower should thoroughly acquaint himself with the quality and size of the fruit he has produced, remembering that the packing house manager cannot get good grades out of his fruit if he has not delivered good grades to the house. If the grower delivers to the packing house a large percentage of poor quality fruit on which the market will not net a profit, the packing house will have to pay for the handling and dumping of that fruit, which serves to decrease the price he would otherwise net for his good grades.

The grower should also keep in touch with the manager and get all information the sales department issues on market conditions, so he can understand the sales situation which the packing house manager is endeavoring to meet.

In the early season, when the trade will take large sizes to best advantage the grower should not insist that the manager pick his fruit if it runs to small sizes, for the sales department will have to discount the greater portion of the crop because of undesirable sizes. The grower will also be forcing his neighbor, who uses the same packing house and who has just the size fruit the market is calling for, to hold his crop until later in the season, when conditions may be changed and he, too, forced to discount quite a percentage of his fruit. The result is the same whether they are pooling or getting settlement on individual sales. Both growers take less money for their fruit than they would if they allowed the manager to select the crops that met the requirements of the market during the different parts of the season.

The grower should realize that a good customer for the special trademark under

which his fruit is marketed is not an asset to the packing house only but to himself, and to enable the manager to keep a customer the grower must co-operate with him in providing constant supply of fruit. The customer does not want several cars of fruit a day for a period of time and then go a long time with no fruit of the brand he has featured and for which he has established a demand.

If a grower has a large volume of fruit, he should distribute it over as many shipping days as his volume and varieties will permit. If he has only a small volume, he should join a sufficient number of other small growers to create a pool by variety sufficiently large that he may distribute his fruit over a greater number of shipping days. The average price paid for fruit by many markets over a number of shipping days is much safer than the average price paid by a few markets on fewer shipping days. If all a grower's fruit is sold in a few markets within a few days, he stands a great risk of losing his year's income from his grove by hitting a slump which will cause his fruit to net little or nothing. The grower should co-operate with the packing house manager to enable him to operate on this basis.

Whether the grower participates in the profits on the packing of his fruit or gets his packing done at cost, he expects the packing house manager to keep the packing cost as low as possible without reducing the efficiency of the packing house or getting out a poor class of work. In order for the packing house manager to do this he must have constant operation of the house for there are certain fixed overhead expenses which go on whether the house is in actual operation or not. If there is a large volume of fruit to go through the house, the longer it is idle during the season the greater the rush when it does operate. In many such instances a manager is forced to sacrifice efficiency and good work in order to attain the necessary volume. The grower cannot expect efficient operation of a packing house from the manager unless he co-operates with him.

The packing house manager has a responsibility to the grower to do all he can to enable the sales department to get the most money for his fruit. He cannot afford to neglect any detail that would cost his growers money.

It is the duty of the packing house manager to study very carefully all information on market conditions that he may receive from the sales department in order that he may intelligently pass this on to the growers. It is only by keeping his growers well informed that he can hope to get intelligent co-operation from them to help him in his work. He should know just the character and average size of fruit produced by each grower who ships through the packing house and so order his picking that he can get reasonably near the sizes the market can take to the best advantage at different periods of the season. If it is necessary to spot pick in order to get the sizes in demand in the early part of the season, he should do it. An increase of two or three cents per box on the picking cost for spot picking during the early part of the season will many times net fifty cents or more per box on the sale price, and the sizes left on the tree will be in better demand later in the season.

The packing house manager should visit groves constantly until the fruit has been picked so he will be informed of the development of any condition which might make it necessary to move the fruit immediately.

The manager should watch field work very closely for rough handling by the picking crew. Plugged fruit and long stems and clipper cuts will cause a lot of otherwise perfectly good fruit to go into the cull bins at the packing house. Much of this damage of fruit cannot be detected on a grading belt, and often goes into the bins and is packed, resulting in many instances, in heavy decay. Growers not only lose fruit because of decay, but lose customers as well, for the trade does not want fruit which will not keep in good condition. The sales department is also put to much greater expense in delivering cars which show decay and in trying to find new customers to replace the old ones who were buying fruit under the grower's trademark, but who turned to other packing houses for more sound stock.

The packing house manager cannot in any way change the grades of the fruit the grower delivers to him. Neither can he put the fruit into higher grades than it belongs and deceive his customers. He should realize that the sales department has to deal with two classes of buyers, one which wants fruit not only for quality but for appearance also, and one which wants fruit for its inter-goodness without so much regard as to appearance for the sake of getting it for a little less money than the first class fruit costs. Then in order to get the most money for a crop of fruit, the packing house manager must separate it into two grades, namely first and choice.

Should he allow fifteen to twenty per cent of his choice fruit run into the first grade he not only would not make any more money for the grower on the choice grade, but in most every instance would get the remainder of his first grade fruit discounted. On the other hand, if he packs a standard first and choice grade, the sales department can deliver both classes of fruit without discounts.

Certainly the house manager should establish a grade sufficiently high to satisfy any reasonable demands of the trade, and he should maintain a uniform grade from the beginning to the end of the season so customers can know just what they are getting any time a car of fruit is offered under that trademark. Unless this uniformity is maintained, the sales department can not establish and maintain a line of customers for this house.

Often a cent or two per box can be saved in the operation of a packing house without sacrificing the efficiency, adding just that much more to the grower's profits. The manager should watch packing operations very closely, and he should see that no more labor is used than absolutely necessary, and that there is no undue waste in nails, paper, crates or other materials. Should the sales department, knowing that the growers who are using a certain packing house having an excessive packing cost, quote fruit from that house at a higher price than the market conditions would warrant, in an effort to overcome this handicap undoubtedly they would lose sales in outside markets and defeat the very purposes for which they were making the effort.

Here is an example of how savings can be effected. One house manager, after a week of apparently efficient operation, checked up on the average size of oranges packed during the preceding week and the average size of paper used and found that by using paper too large for the size oranges packed their paper cost was $146.00 more than it should have been in the one week's operation. Whether the grower who patronizes one packing house will net as much per box on the tree for his fruit out of a given f. o. b. sale as a grower who packs through another house depends entirely upon the ability of the packing house manager to stop any excessive expense or waste in the operations from the time the fruit leaves the tree until it is loaded into the car.

The packing house manager should give careful attention to loading of cars, not only to see that they are properly loaded but to make sure that the arrangement of fruit with reference to grades and sizes is such that the car can be placed by the sales department in the market where this size and quality fruit can best be sold. He should load first and choice grade fruit into as few cars as possible. Certainly a packing house manager can not expect the sales department to handle cars to an advantage if he loads good-size oranges with off-size grapefruit or first grade oranges with second grade grapefruit. It is better to load the first grade fruit as it is packed into solid cars, holding the second grade fruit over for a day or two, thus making it possible to pack solid cars of that fruit also. The manager should follow the same policy with reference to sizes and endeavor to load as many standard cars as is possible.

Only when the packing house manager has taken into consideration these details can he feel that he has discharged his responsibility to the grower and placed the sales department in a position to handle his fruit to the best advantage.

Relations Between Grove and Packing House

Wm. L. Howes, Davenport, Fla.

When a grove owner decides to market his fruit through a certain organization, he is generally guided by a central idea—the *net return*. Until he has received his returns he will have continued dealings with the packing house management and if they are to get the greatest cash returns for the fruit they must work together. Mutual confidence must be established, for without confidence there can never be that team work that is necessary to get results in any line.

The relations between grove and packing house combine two phases and as these phases are inseparable this paper must necessarily touch on each of them. First, the policies best pursued to realize the greatest return for the crop. Second, the best methods in carrying out these policies.

To realize the most for the fruit the packing house manager should be in a position to take advantage of opportunities as they arise. If in placing the crop with his house the grower has placed various restrictions upon its handling or if he has not been definite in placing it, the manager is bound to be handicapped when prompt action becomes necessary. For instance, perhaps the sales manager calls up and offers f. o. b. orders at a good price for certain varieties, grades and sizes. The fruit in question may fill the requirements perfectly but without authority to act the order may have to be declined and passed on to another packing house. This is only one example, for there are countless ways in which a capable packing house manager can take advantage of conditions in the interest of the grove owner.

Having once started, the grove owner should continue through the season with the same packing house. He will probably get some high returns and some low ones but he will learn that no single shipment can indicate final results. It is the average for the crop that tells the story and switching from house to house during the season is seldom profitable.

Frankness between the grower and the packing house management is absolutely necessary. The grower's future is bound up in his crop, and it is only human for him to wish to hear good news. The manager should not let his desire to gratify this wish lead him into over-optimistic statements. Most of us listen to the things we *want* to hear, and an over-optimistic statement or promise will be remembered when a dozen warnings are forgotten. The grower should be equally frank. Sometimes he will not like to admit a lack of quality in his fruit, or

will hold back information, handicapping the packing house in rendering its best service. He may say, "Valencias are drying all around, but mine are all right." This may be true, but sometimes the dry ones take a fearful toll before the seriousness of the situation is realized.

As soon as the fruit is placed with the packing house, the manager should inspect it thoroughly and should keep in touch with it until it is marketed. Here is where the co-operation of the grower helps greatly. The packer should determine the probable amount, varieties, root stocks, proportionate sizes, grade, color, probable future quality and a host of other things that may bear on its value then or in the future. He then knows whether there are lower limbs to be relieved—big sizes to be spot picked—in fact is in a position to make each grade and variety count for the most as the season develops.

The grower can help greatly by visiting the packing house occasionally and watching the fruit from different groves as it is received, after it is washed and as it is graded. Then if he will look over his own crop he will have a clear-cut basis of comparison in his mind, and with market information gathered during his visits he can keep continually abreast of the situation. Calling at the packing house is an excellent habit for the grove owner to cultivate. There will be market reports, auction sheets and other data that will give him much helpful information. It should be borne in mind that the big question for grower and manager to decide, is, "when should the fruit be moved?"

When this decision is reached much depends on the field foreman. His first consideration is the satisfactory movement of fruit to packing house at the lowest possible cost to the grower. This may not sound like a big job, but to handle it and satisfy everyone concerned requires the capacity of a general and a diplomat. He must be able to secure and control labor, and frequently labor that is peculiarly irresponsible. He must be the first one out in the morning and the last one in bed at night. Pickers quit without notice and his force must be kept intact. He must arrange for teams and loaders, always consulting the grower's wishes in advance. He must see that teams and men do not wait on empty boxes, see that trees are not abused by pickers and their ladders, watch for long stems and clipper cuts, bruises and other injuries to the fruit. He must shift his crews from grove to grove without loss of time for teams, trucks, or pickers. He must know fruit, and when the market is low and fruit of poor quality he can often save the grower considerable expense in hauling by culling in the field. A competent field foreman can do much in maintaining pleasant relations between grove and packing house.

When the fruit has been shipped every grower is naturally anxious to know how it packed and graded. This information should be given him promptly, and an accounting of expense should be rendered him with the returns, which should be remitted at the earliest possible date.

Relations between grove and packing house are within the control of the grower and the packing house management.

It is the attitude that counts. When both parties realize that their interests are mutual, and credits each other with this belief, there will be a willingness to understand each other's problems and a mutual helpfulness that is bound to result in that end toward which they are both striving—a better *net return*.

Crotalaria as a Trap Crop for Pumpkin Bugs

J. R. Watson, Agricultural Experiment Station, Gainesville

I suppose every experienced grower here has had one or more unsatisfactory experiences with the so-called pumpkin bug, or Southern Green Stink bug and recognizes it as one of the pests against which he must take precautions. This insect feeds by preference on fleshy, succulent vegetation. In the fall of the year when such vegetation has become scarce it is prone to attack citrus, and many of us have seen a promising crop of oranges ruined by these bugs in a week's time.

It prefers, of course, the fruit with a thin rind such as tangerines, but it is perfectly capable and often does attack a crop of oranges. Grapefruit has too thick a rind to be attractive to these bugs and is usually not much injured, but the grapefruit trees are sometimes severely damaged. They attack limbs which are bent under a load of heavy fruit at the point where the maximum bending occurs. Apparently the stress caused by the bending makes it more easy for the pumpkin bug to puncture the limb at this point. I have seen limbs as big as my wrist killed by this pest.

In the spring of the year when there is considerable tender growth on the trees the pumpkin bugs sometimes do considerable damage to young trees by attacking young twigs which wilt and die.

The damage that these bugs are able to inflict by only a few punctures is out of all proportion to the amount of sap which they withdraw, or the size of the puncture which they make. It is evident that they inject into the wound a poison which is largely responsible for the injurious effects on the plant, doubtless just as the mosquito injects a poison in us when it bites, and perhaps for the same purpose, i. e., to keep the liquids from coagulating before they can be withdrawn.

Citrus growers have long recognized the fact that they must take certain precautions to prevent infestations of these pumpkin bugs in their groves. The precaution which has usually been recommended is thorough cutting of the cover crop by the middle of September. There are three broods of pumpkin bugs each year and the last brood is mostly in the early larval stage by the middle of September. That is to say, there are not many winged adults at that time. The result is that if the cover crop is cut at that time most of the young nymphs perish without being able to reach the trees. If the cover crop is neglected they continue to feed on it until about the last week of October or the first of November when it usually begins rapidly to dry up, and the pumpkin bugs migrate to the trees.

Of the cover crops commonly raised in citrus groves cowpeas are the most preferred hosts of pumpkin bugs, followed by beggarweed and velvet beans.

The most important check on the multiplication of these insects is a reddish brown two-winged fly, *Trichogamma pennipes.* The word pennipes meaning feather-legged, is derived from the very ornamental fringe of long hairs which these flies have on their hind legs. This parasite lays its eggs on the pumpkin bugs; the grub hatching out bores directly into the pumpkin bug and lives at first on the fatty tissues of the body, and finally kills the host. It then forces its way out from the posterior portion of the body and forms the pupa from which the adult fly emerges. The adult fly feeds upon blossoms. At this time of year you will find them common about radishes and other plants in blossom. In 1918, Professor Carl J. Drake, now state entomologist of Iowa, was employed by the Experiment Station through the summer to work out the life history of the pumpkin bug and its parasites. Professor Drake noticed that crotalaria on the Station grounds were very attractive to this parasite fly and that the green pods of this plant were also a favorite food of the pumpkin bug, so that we had in crotalaria a happy combination. The blossoms attracted the flies and the green pods attracted the pumpkin bugs so that we had the pumpkin bugs and their chief parasite brought together. He noticed that pumpkin bugs on crotalaria are much more highly parasitized than others. He suggested that crotalaria be planted in citrus groves as an attraction for these parasites.

But before we cared to recommend such a procedure there was one question that had to be answered. Were the pumpkin bugs liable to stray from the crotalaria to the citrus trees? About a year ago Professor Stokes called our attention to the desirability of crotalaria as a cover crop in citrus groves and inquired concerning the possibility of its introducing into the grove any injurious insects. This at once brought up the subject of pumpkin bugs and we determined to investigate and attempt to determine what effect crotalaria in a grove would have on the pumpkin bug situation. Fortunately we were able to find several groves in which crotalaria was being grown and we were able to watch the behavior of the pumpkin bugs in these groves very carefully all last year. The leaves and stalks of crotalaria are not attractive to pumpkin bugs. We found no pumpkin bugs on the crotalaria until the green pods began to form. These are succulent and great favorites of the pumpkin bugs. The question we had in mind was, would they be more attractive than the citrus fruit? In other words, would the pumpkin bugs stay on the crotalaria or would they leave it for the fruit? As a result of our observations last year we have a definite answer. Pumpkin bugs prefer the green pods of crotalaria to citrus fruit and will not leave it even for tangerines. We have observed many cases of crotalaria growing up in a tangerine tree and in some cases the pods would be heavily infested with pumpkin bugs within two inches of a tangerine and no bugs on the tangerine. With the exception of a single pumpkin bug in one grove we found no bugs on the fruit, in groves in which

crotalaria was growing. So that it seems that crotalaria not only does not increase the number of pumpkin bugs in a grove but actually acts as a trap crop to keep them away from the fruit.

Crotalaria should be so managed that there will be green pods on it the last of October and throughout November. If, by mowing in August, it can be prevented from producing green pods until about this time there should be very few pumpkin bugs in the grove and what few fly into the grove the last of October and November will stick to the crotalaria, and leave the fruit alone, in our experience. We believe we have in this crotalaria not only an excellent cover crop for citrus groves but one that will at the same time act as a very definite insurance against damage from pumpkin bugs, if it is handled correctly.

Of course crotalaria will not be entirely fool proof but I think much safer than cowpeas, beggarweed or other common cover crops. If one allowed it to go to seed and produce a heavy crop of pumpkin bugs until the last of October and then should cut it down, there is no doubt but that the pumpkin bugs would go to the fruit. There would be no other place for them to go. But if managed correctly as indicated above, our observation has been that crotalaria is a very effective insurance against pumpkin bugs.

Crotalaria also has the advantage, in that it is, with the exception of pumpkin bugs on the pods, very free from insect attacks in Florida. In this respect it is a great contrast to cowpeas, beggarweed and velvet beans, all of which have very serious insect enemies. In Asia crotalaria does have some very serious insect pests, and for this reason it is probably advisable to be very cautious in attempting to supplement our very scanty supply of seed in Florida by importations from the Orient, as there might be a possibility of importing some of these insect pests.

In addition to the citrus grower's interest in this plant the truckers may be interested to know that crotalaria seems to be very resistant if not entirely immune to attacks by the root knot nematode.

Crotalaria as a Cover Crop in Citrus Groves

W. E. Stokes, Agricultural Experiment Station, Gainesville

About eleven years ago I got married. The last few years I am occasionally called upon to pester a Florida audience. I am not accustomed to speaking and I have that same old feeling down in the knees that I had when I got married, so that's my excuse for reading my paper, and get rid of it in a hurry. Before I start to read the paper, I assure you it is a short one. I want to tell you that I am not a citrus man; I don't know anything about citrus, except what I have been told, in talking with the citrus men at the Experiment Station and others in the State. Strange then that I should be before this party, composed largely of citrus growers. I guess the reason I am here is that sometimes we get a thing so close to our eyes until we can't really see its value, or see something just beyond.

My work is in co-operation with the office of Forage Crop Investigations, and through the Bureau of Plant Industry, we are constantly receiving plants and seeds from all over the world, particularly with a climate similar to Florida. In 1910, I believe, Dr. C. V. Piper sent some seed of the various crotalaria to the Florida Experiment Station to be planted, and we watched to see what they would do. Prof. Watson has told me something about the early observations on crotalaria, and in fact I believe Mr. Reasoner wrote me he had bought some seed of it in the nineties; anyhow we got this plant and we thought it would be a good forage plant. After observing it several years, it looked all right, but no stock would eat it, and I just about decided we would check it off of the experimental plots, but it made such a good growth on the poor land, land that was nothing but sand, and very poor at that, I thought we wouldn't take it out. I made a trip into Lake County. I didn't know anything about citrus, but I noticed they were using some cover crops in that part of the country, and it seemed to me they were making a poor growth—natal grass, velvet beans, beggar-weed, etc., and I asked Mr. Watson about this crotalaria, as a grove crop.

About that time we began to get in a few specimens from over the State, and we really had some of the stuff growing, so I have been able to look around over the citrus belt a little and have found crotalaria growing in a number of groves, and in a good many isolated places, in Brevard County, Charlotte, Alachua County and Lake County. I made a little side trip over to St. Petersburg this morning and found it right on the sands close to the shore there. It doubtless is in other parts of the State. You all ought to know the value of a grove cover crop.

I will confine myself strictly to a few points we have been able to find out in reference to crotalaria.

An ever present need of the citrus grower or orchardist is a cover crop that will supply his soil with humus and plant food material. Many individual growers have concentrated on this problem and Experiment Stations have given it much careful study.

Along this very line many investigational tests have been made in Florida by the State Experiment Station, and much is still being done. This work is a cooperative one with the Bureau of Plant Industry of the United States Department of Agriculture.

Several years ago, Dr. C. V. Piper, Chief of the Office of Forage Crop Investigations, had sent to the Florida Experiment Station, seed of a number of species of crotalaria, in the hope that some one or more of them might prove of value to Florida.

Our observation and experience with these crotalarias, thus far, leads us to believe that at least two species are well worth trying as cover and green manure crops by all citrus and pecan grove owners of Florida. At least one grove owner, Mr. John J. La Roche of Courtenay, Florida, has grown one of these introduced crotalarias for several years with entire satisfaction. Several of his neighbors, also, have grown crotalaria as a grove cover crop this past season, and apparently with good results.

DESCRIPTION OF CROTALARIA

The crotalaria that looks most promising from the green manure and grove cover crop standpoint, is an erect growing plant not unlike beggarweed in its general habit of growth as the photographs show. The plant has numerous bright yellow blossoms borne on long terminal branches or racemes. The seed are borne in pods similar to sugar peas and to our ordinary rattle box, crotalaria being closely related to the latter. Each pod which is brown at maturity contains many seed varying from light straw color to a deep brown.

The leaf of crotalaria is in three parts, what the botanists call a "trifoliate" leaf, the central leaf being the larger. You will note that it is similar to but somewhat smaller than the leaf of beggarweed. The plant has a deep top root, as photographs show, with some fibrous roots, all of which are abundantly supplied with nodules. Plants vary in height from two to seven feet. When planted thick little branching takes place, thin plantings branch freely.

BOTANICAL NAME

Crotalaria, from the Greek krotalon, a rattle, in reference to the rattling noise made by the seeds in the dry pods when ripe. The two species of promise are *striata* (Latin) meaning fluted or striped and *usaramoensis*, ensis meaning native of and usaramo from the section of that name in what was German East Africa.

ECONOMIC USES

Some species of crotalaria are used for fiber, some for ornamental purposes, and some as forage plants, while some are widely used in the tropics as green manure and cover crops for smothering weeds. Read reference to Messrs. Bam-

ber & Holmes, "Circulars and Agricultural Journal of the Royal Botanic Gardens, Ceylon," Vol. V, No. 17, and Vol. 3, No. 12.

METHOD OF CULTURE

So far as observations at the Experiment Station go, it seems that crotalaria may be handled very much like beggarweed. A bushel of hulled seed weighs from fifty to sixty pounds, and from twelve to twenty pounds of seed per acre planted any time from March to the latter part of June on well prepared land has given satisfactory stands and excellent growth on Norfolk Sandy Soil. (Commonly called high pine land.)

Broadcasting and row seeding both give satisfactory results, the latter method requiring less seed to plant an acre. (Probably four or five pounds.) When planted in spring, the plant starts blooming about sixty days after germination and seed begin maturing in some quantity about ninety days after germination. Blooming is continuous until frost, the plant being killed at 29 to 28 degrees F.

Seed may be harvested as they mature or left to fall on the ground and re-seed the crop. No accurate data are available as to the amount of seed the plant will produce. At the Experiment Station, during the last season the planting shown in Photograph No. 1 yielded about 125 lbs. of hulled seed per acre. Where grown for seed it seems best to plant in rows.

It seems best, under some circumstances to mow crotalaria once during the year to prevent it from getting too coarse. Where this is desired mowing should be done about the time or soon after blooming commences, then a second crop will come on rapidly, soon shade the ground and produce enough seed to reseed the land. This mowing should be 8 to 10 inches high in order to get best results with second growth.

Where mowing has been done after seed are forming and maturing, the second growth has not been entirely satisfactory. This latter statement is based, however, on only one year's observations.

ADVANTAGES AND DISADVANTAGES

The advantages of crotalaria as a green manure and cover crop for groves seem to be about as follows:

It fills a long felt need for a crop which will grow on poor, thin, sandy land, seeds freely, controls pumpkin bug injury, reseeds well, smothers out undesirable plants, and when turned under adds to the soil plenty of vegetable matter rich in nitrogen. Crotalaria seems to fill this bill as well, if not better than any summer legume yet tried.

A comparison of the chemical analysis of crotalaria as compared to analyses of cowpeas, velvet beans, beggarweed and natal grass is interesting if not most encouraging.

According to Henry's Feeds and Feeding:

POUNDS OF NITROGEN IN ONE TON OF HAY

Beggarweed	49.2	equivalent	to	300	lbs.	$NaNO_3$
Cowpeas	61.8	equivalent	to	386	lbs.	$NaNO_3$
Velvet Beans	52.4	equivalent	to	328	lbs.	$NaNO_3$
Natal Grass	23.6	equivalent	to	148	lbs.	$NaNO_3$
Crotalaria analyses by Florida Experiment Sta	68.4	equivalent	to	428	lbs.	$NaNO_3$

POUNDS OF NITROGEN IN ONE TON OF GREEN MATERIAL

Beggarweed	13.4	equivalent to	84	lbs. Na	NO_3
Cowpeas	9.6	equivalent to	60	lbs. Na	NO_3
Velvet Beans	11.2	equivalent to	70	lbs. Na	NO_3
Natal Grass	2.88	equivalent to	18	lbs. Na	NO_3
Crotalaria analyses by Florida Experiment Sta.	20	equivalent to	125	lbs. Na	NO_3

Nitrate of soda analyzing 16 per cent Nitrogen.

These figures are not given to argue that crotalaria being higher in nitrogen than some of our commonly used cover crops is therefore the better crop but merely to show that it compares favorably with our commonly used cover crops.

The disadvantage of crotalaria as a green manure and grove cover crop seem negligible. It sometimes happens that grove owners cut their cover crops for feed. This could hardly happen in the case of crotalaria since stock apparently care but little for the plant either green or dry.

Some Australian feeding experiments with crotalaria striata indicate that the plant is poisonous to goats if fed in the green state, but the poisonous property is lost on drying.

Mr. Stokes: I have some specimens here, if any of you are interested in them.

Member: Which one of the crotalaria do you consider the best for cover crop?

Mr. Stokes: Of the two that I have mentioned?

Member: Of any of them.

Mr. Stokes: There are two kinds of seed. The olive green is Crotalaria striata; the red is the Usaramoensis ensii. Some of these plants have common names. We can call them crotalaria, or rattle-box. I don't know as one is any better than the other. Crotalaria striata —that particular species—seeds a little more frequently.

Member: Which grows the biggest?

Mr. Stokes: They both grow about the same height I believe.

Member: Which kind does Mr. Roach have?

Mr. Stokes: The striata. I was on Mr. Roach's place Monday. He has plantings made in March; plantings made in June and across the fence plantings made in August. All those plantings made a satisfactory growth. Probably the March planting didn't make quite as good a stand as the June and August planting. We have to have plenty of moisture and warm weather to get the best stands.

The Economic Spraying of the Citrus Grove

H. E. Stevens, Ft. Myers

You have listened to a great many problems discussed during the meeting, and I imagine you feel a good deal as I used to feel after attending some meetings in Gainesville. We were called in about once a week and lectured along certain lines of work, and after listening to the specialists of different kinds and various others, I would sometimes go back with the feeling that I was not equal to the task of handling all the problems that confronted me. You have heard the problems discussed at this meeting, and I expect you are pretty well fed up on problems of the Citrus Grower, but as I see it, your main problem is getting a profit for the fruit you produce. All your other problems are based on that. My subject:—"The Economic Spraying of the Citrus Grove" has a certain bearing along this line.

The title of this paper may be just a little misleading, as I do not intend to offer any prescribed formula that will enable you to handle your diseases and insect pests with greater efficiency or more economy.

My object in discussing this matter is to set you to thinking a little more along these lines since the subject may have a direct influence on some of your marketing problems. There is a demand for the production of a larger percentage of first grade fruit, and I think it has been rather clearly demonstrated this season that there is little profit in growing other than first grade fruit. With the annual increase in our citrus production, we may expect these conditions to maintain for some time to come, and the citrus grower who wishes to dispose of his crop to advantage will have to decrease his production of low grade fruits. I believe that a majority of the citrus growers at least are attempting to produce fruit for the profits there are in it and if only the best fruit brings a profit, it is simply a matter of business to produce the largest possible amount of the best.

Pest control is an essential factor in the production of first grade fruit and a majority of our citrus pests are controlled either through spraying or dusting. These are two phases of grove work that should probably be given as much consideration during the next few years as the marketing problems, for the marketability of your fruit may depend entirely upon how well your grove has been sprayed or dusted. It is important, then, that our control measures give the maximum efficiency and they must be made on an economic basis, for the present prices for fruit will not permit of any extravagant practices in the grove.

Much has been written and published

on the control of citrus diseases and insects and the subject has been discussed time and again in previous meetings of the Horticultural Society, so I feel that the average Citrus grower recognize the importance of pest control and does a reasonable amount of spraying in his grove. There are some who spray more than is really necessary, and others who get very little results from the sprays or dusts they do apply. This is both expensive and discouraging and frequently leads to the belief that there is probably not much in spraying after all, or that it is such a complicated procedure that the average grower is unable to handle it successfully. There is very little value in poor or improper spraying—not enough, in fact, to justify its use. Spraying is not a complicated process if we take the trouble to determine the why's and wherefore's before we attempt to spray.

We may consider spraying under two general classes—Theoretical or exact spraying, which we will leave to the scientist, and practical spraying, which is ordinarily employed in the citrus groves. Practical spraying may be further subdivided into good, bad and indifferent. Theoretical spraying has all the exactness of a mathematical problem. A given material is applied to a given trouble, in a given amount, under given conditions, at a given time and a given result is obtained, usually one hundred per cent perfect. This is just a little too precise for the busy citrus grower and I am inclined to believe that the scientist is often a little too exacting in the details of his control measures for practical use. Theory and practice do not always go hand in hand.

Practical spraying is a modification of the above formula for the growers use in the field, and this form of spraying will frequently vary in efficiency from ninety-five per cent to zero. Now why do citrus growers get such a variation in the results from their spraying operations? Two neighboring grove owners will both use practically the same equipment, the same spray materials and make the same number of applications per season. One will control from ninety to ninety-five per cent of his pests, while the other will not control over thirty to forty per cent. Both will insist that they made thorough spraying and that every precaution was taken to see that the materials were properly prepared and applied. This makes spraying seem a little uncanny to the man who has been unfortunate in controlling his pests.

For the past three years I have had occasion to observe grove spraying in its practical form and to observe some of the results obtained. I do not believe that the citrus growers, even the most progressive ones, are getting full value for the time and money put into their efforts. In many cases it is a waste of time and materials. I fully advocate spraying. It has been my business for the past twelve years to advise in regard to disease control, and I think I can see both the scientific and the practical sides of the question. It is just as necessary for the citrus grower to spray his grove as it is to fertilize it, and spraying should be given the same judicious consideration. However, I do not advocate spraying when it will cost as much or more to control the pest as is gained from the re-

sults of the spraying. If it takes all the profits from the crop to produce bright fruit, there can be little incentive for spraying. Ordinarily this should not be the case, but I have seen instances where it was so due largely to poor management of the spraying throughout the season. It costs money to spray and every unnecessary application or poorly applied application, eats into the profits from the grove and gives no returns. It is useless to spray or dust unless you accomplish results and the size or extent of the results must be given due consideration. It will not pay to half control a pest and I would hesitate to advise any grower to spray with that outlook in view.

Now what is the trouble with a large per cent of our grove spraying, and why do we not get better results? It is not due to lack of information concerning diseases and insect pests, or lack of efficient remedies in most cases for their control. It is not due to lack of interest in pest control, or lack of application of the methods and remedies advised for control. Citrus growers are giving more thought and attention to these subjects and there is more spraying done in the groves throughout the state than ever before. But is this effort is spraying accomplishing the results that it should? Thousands of dollars are spent annually for spray materials, spray equipment and labor for spraying the grove, and I am forced to believe that a large part of this sum is wasted as far as material results are concerned. We may have all the necessary information available for pest control; we may have the best equipment that can be purchased; we may use the best materials obtainable; and then fall down on the control of some pest that should be easily handled by a little forethought. I have seen this demonstrated time and again and I have come to the conclusion that most of the trouble in faulty control lies between the spray nozzle and the pests we are trying to hit. I should judge that improper spraying and untimely spraying costs the citrus growers of the state about as much each season as is saved through proper spraying, and much of this loss can be charged up to the man who handles the spray rod or gun. The grove owner, manager or foreman may thoroughly understand all the details of proper spraying but nine times out of ten the man who handles the spray rod has no conception of the pest he is fighting, or how the material he is using affects that pest. Still the efficiency of that spray application depends upon how well this man does his work. To know why you are spraying and what you are accomplishing are two points that should be clearly understood if we expect the maximum results from spraying. I do not expect the growers to employ experts, trained in plant diseases and insect control, to actually apply their spray materials but so long as we depend on common, ordinary labor to do this work we may expect a great variation in the efficiency of our spraying operations unless constant watch is kept over the men handling the nozzles.

It would seem an easy matter to teach any person how to properly spray a tree and expect him to continue in that way, but here again theory and practice do not agree. As I mentioned before, the aver-

age laborer does not understand the essentials of spraying, and his idea of thoroughness may be a drenching of the trees; or parts of the tree, and using up as many spray tanks of liquid as possible, if you insist on thorough spraying, or, in covering as much ground as possible if you insist on economy of spray materials. Simply drenching a tree is by no means proper spraying and it only results in the loss of spray materials and a lowering of the efficiency of the application. This is particularly true with the fungicides. The object in spraying is to cover the parts we wish to protect, or the insect we wish to kill, with a thin, even covering of the spray material. If we can apply the spray in a very fine mist, this is readily accomplished as the small droplets will spread and make contact with each other, forming a thin, continuous film over the sprayed part. This can only be done by having a good pressure, the spray pump and nozzles in good working order, and by proper manipulation of the spray rod or gun. Where an excess of the liquid is applied, or where applied in large drops, it runs off and does not leave a sufficient amount of the material to give protection or to be effective. So, over spraying may result in just as poor results as insufficient spraying, with the additional loss of spray materials.

I had occasion this past winter to check up on some spraying made for purple scale. The oil emulsion sprays were applied during October and November, and applied by spraying crews that were supposed to do thorough work. I made counts of leaves from several groves for live scale, on both the upper and under sides of the leaf. A binocular microscope was used in making the counts, and there was no difficulty in distinguishing live scales from dead ones. The results were somewhat surprising. It was quite common to find from eight to ten live scale per leaf, and in some cases from thirty to forty live scales were observed on a single leaf supposed to have been thoroughly sprayed a few weeks previously. A majority of the live scales were well matured, and it was evident that they had not developed after the spray had been applied. The leaves were collected at random from the groves, but care was taken to select leaves that I felt sure should have been hit by the oil emulsion. I am wondering now just how many live scale we can permit to a leaf and still do practical scale spraying. It seems to me that even eight to ten live scales per leaf, following a thorough application of oil emulsion, is too large a percentage for efficient work.

Now, the man who handles the spray rod or gun, is not responsible for all of the faulty or inefficient spraying. Some of it can be charged up to poor materials and faulty equipment. We generally forget all about the spray machine after we have finished one job until we have occasion to use it again. Then it is hauled out, loaded up and taken to the grove, and trouble usually begins. I have seen spray crews idle for hours in the grove while the spray pump was being overhauled, the engine fixed, or the nozzles worked on. Maybe, the greater part of the first two or three days spraying is spent in getting the spraying machine in

working order, and these two or three days may mean valuable time lost as far as the control of the pest is concerned. It is better economy to employ the time of one man, or a mechanic even, to put the spray machine in order before starting operations, than to waste one or two mens time after spraying has started. Antiquated and worn out spraying machinery will not give efficient service, but it will add materially to the general cost of spraying.

We have made progress in the development of our spray machinery during the past few years, but there is still room for considerable improvement. With the modern, high power sprayers, giving a pressure of from three to four hundred pounds, a reasonably fine mist can be produced which is essential to efficient spraying. The volume of this mist is rather small however, and this limits the capacity of the spraying outfit to a comparatively few acres, which is quite a factor in the cost of spraying. What is needed, and which will probably come in time, is a machine that will discharge a sufficient volume of mist to instantly envelop the tree, doing away with the nozzle and spray gun. Under such conditions, spraying could be done with the same rapidity as dusting, which would materially reduce the cost of application and shorten the time element, frequently an important factor in holding a pest in check. I believe such a machine is feasible and if some of our manufacturers of spray machinery would turn their attention along these lines, they could render a valuable service to the citrus industry.

Economy in spraying and pest control will probably be given more earnest consideration by the citrus grower in the future than it has in the past. As his margin of profit becomes smaller, he will be forced to practice many economics and it seems to me that spraying and dusting are promising fields to begin with. All will agree that spraying is expensive. Labor, spray materials and spray machinery are all more expensive than they should be, when compared with the present prices of citrus fruits. With all of this, the grower may still effect a considerable saving in his spray bill by increasing the efficiency of his grove spraying. The number of sprayings can be cut down to those absolutely necessary for pest control and each application can be made from ninety to ninety-five per cent efficient by thorough spraying and spraying at a time when it is possible to get the best results. This will require some careful planning and some study and thought on the subject of insects and diseases.

Pest control is a business proposition and I believe it can be carried out along business lines. It has been said that the farmer must know the Botanical name of the plant he grows, the Entomological name of the bug that attacks the plant and the pharmaceutical name of the preparation he uses to kill the bug. This will probably apply just as well to the citrus grower and he may know all of these things and still not be able to successfully cope with the pests in his grove. It seems to me that the citrus growers could get more economy and greater efficiency in their grove spraying if the work was car-

ried out co-operatively under the direction of some one who thoroughly understood the subject of pest control.

The different Citrus Growers' Associations, organizations or communities, for that matter, could well afford to employ a man who has had technical training in plant diseases and insect control, to frequently inspect the groves of its membership, and to advise and direct all pest control operations. A properly qualified man would more than save the cost of his salary in the elimination of waste, untimely and unnecessary sprayings. I believe that any packing house handling from seventy-five to a hundred thousand boxes of fruit or even less, could well afford the services of such a man. I realize that a service somewhat along these lines is given gratis, by the different Fertilizer Companies, the Citrus Exchange Supply Company and the Extension Department of our Agricultural College. While this has been of great help to many growers the men conducting this work have had too large a territory to cover and their recommendations or advice is of necessity more or less general. In advisory work of this nature, the territory or acreage that one man could handle would have to be limited if frequent inspections of the grove properties were made and monthly visits would be necessary if he kept in close touch with conditions in the groves under his supervision.

If you will pardon a reference to my present work, I will briefly outline a plan which the Stripes Citrus Packing Company of Lee County has adopted this year. A position was created for a field man, as pathologist and entomologist, to assist the members of the company in handling their grove troubles. The main object of the work at present is to increase the percentage of first grade fruit. I had the honor of being selected to take up this work and it is my duty to visit and inspect the groves of the various members at frequent intervals and to keep in touch with the conditions and work being done on each grove. If I find that the grove needs spraying for any particular disease or insect pest at the time of inspection, a written memorandum is given to the man in charge, of what he is to spray for, when to spray, and the kind and amount of materials to use. A carbon copy of the memorandum is filed in the office. Attention is also given to the condition of the spray equipment and the work of the spray crew. A record of the seasons spraying in each grove, for each disease and insect pest, is kept, in which is recorded the time the application was made and the materials used. This record will be checked against the grade sheet at the end of the season, which should show just what the grower has accomplished by his season's spraying.

In addition to the pest control work, data is also being collected on the use of fertilizers, culture irrigation, drainage and other subjects connected with practical citrus production. In a few years we will have a valuable fund of information and recorded data on hand which should prevent the growers from making the same mistake twice. While this information will be kept on file with the Stripes Company, it is the wish of Mr. Hugh Macdonald, Jr., the Trustee, that it be made available to those interested in the progress of citrus culture, and the production of better grade fruit.

Purple Scale and its Control Following the use of Bordeaux Oil Emulsion for Melanose

W. W. Yothers, Entomologist, Bureau of Entomology, Orlando, Florida

In many instances during the past season the Purple scale following the use of Bordeaux-oil emulsion for melanose has caused severe and serious injury. As is well known most insects infesting citrus trees are attacked by beneficial or entomogenous fungi. The Purple scale is no exception and is fairly well kept down in unsprayed groves by several species of these fungi. When Bordeaux or other effective fungicide is applied to prevent melanose or other injurious diseases it likewise prevents the usual development of the friendly fungi. Under such conditions the scale becomes very abundant. However some of the most severe cases of scale damage that we have ever seen did not follow Bordeaux-oil emulsion.

The severe damage during the past season was present on groves that had received the usual follow up oil emulsion spraying in late June and also in groves that were left unsprayed until fall. The damage to those groves left without treatment until fall was very severe. To these growers we can only issue another warning the same as we have always given—If Bordeaux-oil emulsion is used spray in late June or early July with an effective oil emulsion for scale.

In cases where the regular spraying was given in late June and early July, the excessive abundance of Purple scale was no doubt due to several possible facts. Owing to lack of specific proof however we are only enumerating the several possibilities.

(1) The oil emulsion may not have had the required percentage of oil when sold.

(2) The oil may not have possessed the proper physical properties.

(3) The insecticide may have been used at a too great a dilution to produce an effective mortality.

(4) Lack of thorough application by the sprayers, and

(5) Spraying at the inopportune time.

In fact any one or a combination of any of these might result in a lack of proper scale control.

There has been some complaint from growers that certain oil emulsions have not been up to standard. While I have not followed up this matter, it is to be hoped that all products sold in this state have the required percentage of oil of the proper physical properties.

GRADE OF OIL TO USE

For many years an oil having the following specifications has been used with satisfactory results.

Specific Gravity	.886
Flash point	184
Fire point	207
Viscosity (Engler—Water=1.)	365.3
Volatility	4.9

This has been a satisfactory oil for white fly when used at 1 per cent of oil and ordinary infestations of Purple scale. At a greater strength, 1½ to 2 per cent, no doubt it will also produce a satisfactory mortality on severe infestations of scale.

The results however are more certain on severe infestations of scale if an oil of the following specifications is used.

Specific Gravity	0.902
Flash point	125
Fire point	225
Viscosity (Engler—Water=1.)	153.8
Volatility	0.11

This oil is much better to use when rains are frequent and temperature high. For scale control in June it should be used at the rate of 1½ per cent of oil in the spray material. We have used this oil in our experimental work for several years with perfect success. It is also used to a certain extent by some commercial insecticide manufacturers.

LACK OF THOROUGH APPLICATION

I regret to say that as yet the average spraying is not thoroughly done. Many growers do not have a proper conception as to thorough work. It might be well to read in Farmers' Bulletin 933 just how to spray a tree and govern your actions accordingly.

To control scale following Bordeaux-oil emulsion the follow up spraying with oil emulsion should be given sometime during the last week of June or the first week of July. This is the period when the maximum numbers of scale crawlers are present. This stage is the most easily killed by the insecticide.

In case rust mites are present it is advisable and desirable to use the combination spray of dry soda sulphur, 5 to 6 pounds to 200 gallons of water and the oil emulsion.

Mr. Skinner: I want to ask Mr. Yothers what the prospects are for parasites for this new citrus aphid?

Mr. Yothers: It won't take me very long to tell you what I know about it. To make a long story short, I heard rumors for several months about the aphids, but I didn't pay any attention to them. I was busy. I didn't receive any letters so didn't pay much attention to it, but I guess we might as well be frank and use names. Mr. Fugazzi wired to Washington that there was a serious infestation of aphids here and some people called it Black Fly. When they talk about Black Fly in Washington somebody gets busy, so I started down here immediately. They instructed me from Washington to do so. I came down here with Mr. Fugazzi and Mr. Zimmer-

man, and I have to admit that Mr. Zimmerman did most of the talking, which is to his credit. I thought it was the melon aphid, but it acted differently. Mr. Zimmerman said it got to going good in warm weather, and had various other traits. I never saw an insect so abundant. I sent a can of them to Washington, and Dr. Baker and Mr. Mason who are our specialists on aphids, wrote me that they had never seen this aphid before, and it wasn't in the collection in the museum. So they took Delguerico's Works, the Italian author, and traced the aphids, without any difficulty whatever to Aphis citricola Delguerico. This makes it an Italian species, so that isn't very inspiring to an entomologist or citrus grower.*

I wired for a list of parasites of this insect in Italy, and they wired back immediately that nothing is known of the control of this insect by parasites in Italy.

We haven't seen any parasites present in the three times I have been in the groves. I have found several insects that are brown, but they don't seem to be parasitized. Mr. Beyer was going to give a report but he couldn't do so; he is out of the State owing to unforeseen circumstances.

Mr. Skinner: What about their habits of life?

Mr. Yothers: Nobody knows anything about it.

Mr. Skinner : Will it be worse next year?

Mr. Yothers: Well, it maybe. Mr. Zimmerman and Mr. Beyer have made more observations than the rest of us, and Mr. Beyer isn't here.

Mr. Zimmerman: I will try to tell the folks something I don't know about the aphids and some of the mistakes I have made trying to kill them. I have spent $3,000 or $5,000 on it, and haven't found anything to kill them. We transplanted about 3,200 trees last year, the hail came along and knocked off all the foliage. As the foliage started back the aphids came with it. I have brought a few samples to show you what it did, and what I have here is some foliage from trees that the aphids struck last year. It started in the latter part of May; the hotter it got the worse they got, until the twigs were covered, something like the twigs there, or worse. The first thing I did when I got hold of them I wired for 30 gallons of Black Leaf 40. I sprayed everything and it didn't seem to do any good. I used this spray with Kayso added. That did not do any good. I used soap and Black Leaf 40 without results.

If you stir these aphids with something they don't like, they will simply crawl down the body of the tree, like ants, collect at the foot of it, and bunch up in small bunches. After they stay there two or three hours they seem to know when the effects of the spray is finished, and up the tree they go again. Now I suppose some of you wonder what I have been drinking; I can take you out and show it to you.

I used nitrate of soda in January, and the minute the new growth came out, it

*This pest has been recently identified as Aphis Spiraecola (Retch) a native perhaps of North America. W. W. Y.

took it. The leaves curled up and stayed on the trees all winter, but this Spring when the sap came up and the old leaves commenced to drop off, it left them in twigs like this. They are dying. The minute a new growth comes up the aphids take it, and it dies. The trees are dying.

Now on these trees I just gave out, a week ago last Monday morning, they were sprayed; one week before that they were sprayed with whale oil soap and sulphate of nicotine.

I have some tangerines which were planted last year. The last week in January I sprayed them with the whale oil soap and nicotine, and they have been sprayed every Monday since, including last Monday, and in March, thinking possibly I hadn't sprayed them often enough I gave four sprays three days apart. In those tangerines I have watermelons. The aphids are on the trees and do not touch the melons. So that shows they are not like the melon aphids.

I have one block there I have sprayed and dusted possibly fifteen times, with very little results. I will find something new, and think it will kill them all. It seems to kill 75 to 80 per cent. In a week's time they are back as bad as ever, and the second time it doesn't kill them as fast as it does the first time. The strength that they tell you for melon aphid doesn't have any results; it's a tonic. The first time the foreman reported 100 per cent, but the second time he says "There is something wrong."

I have tried dust, dust bought from everybody that had any to sell almost, and finally I got some 2 per cent dust and added 2 quarts of Black Leaf—40 to 100 lbs. of dust, and mixed the dust with a machine we have, which would give approximately a 6 per cent nicotine dust. Just giving an dusting like you ordinarly would, killed possibly 60 or 75 per cent, but I got 100 per cent kill with some trees by using a duster and just allowed a very little dust to blow on the trees, and keeping it up for five minutes. Unless you keep it on for three to five minutes, it doesn't kill all the aphids.

I have had half a dozen salesmen that had something which they guaranteed. Finally I told them I would buy it whenever they killed them all, but none of them ever came back to see if they killed them. I haven't found a thing that is practical that will kill them. I have worked on them since last May. They have been with me all the time. The worst affected trees are the Temples; Tangerines next, and Valencias next. Grapefruit is practically immune. The Grapefruit became infested with a brown aphid. It doesn't seem to have very bad results, but the brown aphids took it. It doesn't seem to work around on the trees and move from one side of the tree to the other as the green aphid does.

The mature aphids, after they have grown legs, and the sun is hot on one side of the tree, simply seem to walk around the tree on the other side. You spray them with potash and it isn't strong enough and they will simply walk down to the base of the tree and later go up the tree again. I haven't sprayed the grapefruit trees at all.

Mr. Skinner: We have one more paper on this subject, but it seems to me that this matter is so serious we ought to

take some action, looking toward the Government's making some special effort to go to Italy and find out if there is any control of this insect, and if somebody will make the motion, the Chair will appoint a Committee to draw up a Resolution to go to Washington and get us a remedy.

Mr. Stevens expressed himself that if we didn't stop it pretty soon it would be as serious as canker.

Mr. Sandlin: I move that the Chair be authorized to appoint a Committee to handle this matter, with both the State and Federal authorities toward getting some solution to eliminate or control this pest. Motion seconded. Passed.

Pres. Skinner: I want to announce the Committee to take up the aphids question with the government. When Mr. Hume retired from the Presidency, we all know what a loss we felt, and I said to Mr. Hume: "There will come times when we must call upon you." He said "Skinner, you know I have never failed you." I believe this is the time we must call upon him. I have appointed Mr. H. H. Hume, Mr. W. J. Krome and J. C. Chase, to go to Congress and get action in order to send to Italy and get natural enemies for the control of this insect. I think this is the most serious thing we have ever had aside from canker; I believe it can be controlled much easier, but it must be gotten at now.

I will appoint one more Committee at this time, the Committee on Beautification; the duty of this Committee will be to meet with the Beautification Society that meets in Tampa this Fall. I will appoint:

Mr. B. F. Floyd, Orlando.
Mr. Frank Stirling, Gainesville.
Mr. N. A. Reasoner, Oneco.
Mr. Ed. L. Ayers, Gainesville.

The Cottony Cushion Scale Vedalia Situation in Florida

Dr. E. W. Berger, Entomologist, State Plant Board, Gainesville, Fla.

Soon after the organization of the Plant Board in 1915, the distribution of the Vedalia, or Australian Lady-Beetle, became, and is now one of several projects of the Entomological Department. During this period (1915 to 1924) thousands of these useful insects have been sent out to growers who were in need of them for the control of Cottony Cushion-Scale. The price charged for a colony of ten, with directions for colonizing, is $1.00. This charge is made in order to partly reimburse the Plant Board for the cost of rearing or collecting and distributing them.

For the benefit of those who have only more recently entered the ranks of the Florida citrus growers and horticulturists (for the Cottony Cushion-Scale infests many other useful plants besides citrus) it should be stated that the Vedalia, or Australian Lady-Beetle, is the best known natural enemy of Cottony Cushion-Scale, and produces almost a perfect control of this pest. All active, or feeding, stages of the Vedalia feed upon all stages of the Cottony Cushion-Scale, including the eggs. In fact, my observations indicate that the eggs of the Cottony Cushion-Scale are the favorite food of the Vedalia. The scale in its various stages is, futhermore, the only food of this lady-beetle.

Before I proceed, some of you may also wish to learn something of the origin and introduction of both the Cottony Cushion-Scale and the Vedalia into the United States. I will state only the bare facts. The scale was introduced into California from Australia on a species of acacia (*Acacia latifolia*) in 1868 or 1869. By 1888 it had spread throughout the citrus-growing areas of California and was making citrus growing exceedingly difficult. During the last named year, Mr. A. Koebele, an entomologist in the employ of what is now known as the Bureau Entomology, U. S. Department Agriculture, was sent as a representative of the United States to the Melbourne Exposition with instructions to spend his spare time investigating the status of the Cottony Cushion-Scale in Australia and collect any insects that appeared to be effective in keeping this scale under control. That a lot of 127 Vedalia, successfully forwarded to California, became the ancestors of the present living progeny of perhaps billions of these useful beetles in the United States,

was the outcome of Mr. Koebele's work in Australia. In California, he was ably seconded by Prof. D. W. Coquillett, who succeeded in colonizing the beetles so successfully that by the end of eighteen months the Cottony Cushion-Scale was under control and the growers and all others interested rejoicing.

The scale was introduced into Florida at a place called Keen, near Clearwater, in 1893, by two brothers, who were nurserymen and growers. Having heard of the wonderful Vedalia in California, they wrote to somebody there in regard to it. While it has been maintained that they did not send for Vedalia, nevertheless some of them, together with some Cottony Cushion-Scale that had been included as food, were received, admired (doubtlessly) and left under some citrus trees in the yard. In 1894 two cleanup campaigns were undertaken, one by Mr. H. G. Hubbard, an entomologist of the United States Department of Agriculture then stationed in Florida, and a few months later by Professor P. H. Rolfs, at that time biologist and horticulturist of the Florida Experiment Station. These efforts were unsuccessful. However, it appears that the big freeze of 1894-1895 gave the scale such a set-back that its recurrence was not noted until November 1898, at Clearwater. In 1899 and 1900 a control campaign was undertaken under the leadership of such men as the late M. E. Gillett, Mr. Jno. Thompson, and Prof. H. A. Gossard, the latter representing the Experiment Station The County Commissioners appropriated five hundred dollars. The Vedalia was also introduced from California and that "turned the trick."

A second introduction of Vedalia into Florida was made by Messrs. C. W. Barnes and S. F. Poole at Winter Haven, probably in January 1914, in the Scofield Grove, using Vedalia shipped to the Winter Haven Citrus Growers Association from California. Through the courtesy of Mr. Poole, the writer saw this colony soon after it had become established.

Now, as to summarizing the present Cottony Cushion-Scale-Vedalia Situation in Florida, I doubt if I could do that any better than to quote from a letter, dated March 5, 1924, which I wrote to Mr. W. W. Yothers, Assistant Secretary of this Society, in regard to my subject for this meeting:

"It is becoming more and more apparent to me that were we to discontinue the distribution of Vedalia today, that Florida Horticulturists would henceforth suffer but very little from the depredations of Cottony Cushion-Scale. In other words, the Vedalia has been colonized from Pensacola to Key West, and from Fernandina to Ft. Myers, so that Vedalia now occurs in all the principal citrus-growing sections of the state, as well as in many other localities where this scale has appeared, so that it is now probably nearly always possible for Vedalia to migrate from one district to another whenever its food supply fails it in one, and vice versa, when conditions become reversed.

"Again, the situation throughout the state is becoming like it has been in Pinellas County for perhaps some twenty or more years. Cottony Cushion-Scale

was first introduced into Pinellas County, and, of course, the Vedalia soon after. Pinellas County being more or less isolated, and surrounded by water, that resulted in the scale being more or less localized there for a number of years, and, of course became distributed from one part of the county to another, with the result that during my presence in the state of 18 years, I should estimate the number of complaints about Cottony Cushion-Scale coming from Pinellas County as on an average of one or two per year, and I feel very certain that these minor outbreaks of scale would have been controlled by the Vedalia without any additional introductions of this useful beetle.

"As an illustration, I recall how, some years ago, a prominent grower of Clearwater, wrote me about getting Vedalia, and after corresponding with different people in that county, I finally succeeded in locating some for him. He later advised me that when he brought the Vedalia that he had collected to his grove, he found plenty of Vedalia already present. They were either present when he observed the scale, failing to observe the Vedalia, or else they had preceded him to his grove during the period of perhaps two or three weeks that it required to locate Vedalia for him."

By picturing the Cottony Cushion-Scale—Vedalia Situation in such a roseate and optimistic manner.. I do not for a moment desire to encourage growers to discontinue introducing Vedalia whenever they find Cottony Cushion-Scale in their trees or shrubs, without the Vedalia being present, because we are planning to continue supplying Vedalia so long as growers request them.

Finally, the writer feels that he has probably never undertaken another Entomological project that has given him such personal satisfaction, and apparently the growers are also satisfied. Of course, furnishing Vedalia has not always been without difficulties. Neither the demand nor the supply are regular. Neither does an abundant supply of Vedalia very often coincide with a strong demand for them. However, between the co-operation of many of the assistant inspectors of the Plant Board in the field, especially the Assistant Nursery Inspectors, who have generously aided the Department whenever they found either Vedalia or Cottony Cushion-Scale, or both, as well as many growers who have generously assisted us by sending liberal quantities of scale for use in rearing Vedalia in the laboratory at Gainesville, we have succeeded in filling all requests for Vedalia since the Plant Board undertook to supply them. At times we have had to request the forbearance of growers when we were out of a supply and could not furnish any for two or three weeks. But we have always eventually been successful, no matter how hopeless the outlook, in receiving or rearing a supply and finally filling all requests.

While the Vedalia is undoubtedly the principal natural enemy of the Cottony Cushion-Scale in Florida, and the scale invariably comes under control soon after they are introduced, an unidentified fungus disease, which the writer calls the Cottony Cushion-Scale-Fungus, has been observed several times as very effectively

reducing the scale. A similar fungus (probably the same) was also observed by Prof. Gossard during the campaign against the scale in Pinellas County in 1899 and 1900. The Scale-Eating Caterpillar (*Laetilia coccidivora*), apparently universally present, also feeds extensively on the Cottony Cushion-Scale as well as on other soft scales.

The Cryptochaetum * was colonized by the writer at Stanton (22 specimens), and by Mr. J. Chaffin at and near Winter Haven (about 70 specimens), in March, 1917, using specimens received from Mr. Harry S. Smith, then Supt., State Insectary, State Comm. of Horticulture, Sacramento, California. Cryptochaetum is a small two-winged insect (a fly) that undergoes its development within the bodies of Cottony Cushion-Scale and has been found to be very effective in the control of this scale in California. Some observers in California are even of the opinion that Cryptochaetum may, at times, be as effective as the Vedalia. It has not been possible to determine whether the colonization of this useful parasite in Florida has been successful or not, notwithstanding that both localities have been revisited by the writer, and specimens of Cottony Cushion-Scale received from them have been repeatedly kept in breeding jars, hoping that this parasite might be recovered. In fact, a crew of Plant Board inspectors, under the direction of Mr. H. C. Artis, operating in the Winter Haven section during the spring of 1921, were requested to send any findings of Cottony Cushion-Scale worth while to the writer, in order to examine them for the presence of Cryptochaetum. Very little scale, however, was received, and it is apparent that the scale is unusually scarce in that locality, a fact apparently also true for Stanton.

The writer has deemed it desirable to list and to briefly discuss the three last named natural enemies (the fungus, the caterpillar, and the Cryptochaetum) here, because of their possible bearing on the subject under discussion.

**Cryptochaetum (Lestophonus) monophlebi (Skuse)*

Commercial Contol of Citrus Melanose in Florida in 1923

J. R. Winston, Pathologist, U. S. Department of Agriculture, Orlando

During the past several years state and federal agents have been conducting spraying experiments in various parts of Florida for the control of citrus melanose. Before these tests were begun it was thought that at least several applications would be required to effect a satisfactory control. On the contrary these experimental tests have indicated consistently that melanose infection could be successfully prevented by a single application of Bordeaux mixture provided the spraying was completed before the May rains set in. While a single application of spray could hardly be expected to give absolute protection the reduction in the amount of melanose had been shown to be so great that growers generally became interested in spraying for melanose control.

In 1922, after a year or two of preliminary trials, a rather large number of growers sprayed their groves with Bodeaux-oil emulsion for the control of melanose and most of them obtained very satisfactory results. In 1923 a much greater number of growers sprayed their orange and grapefruit trees for the prevention of melanose with about the same results as had been obtained the year before although the weather conditions during the spring of 1923 were somewhat more favorable for early infection than was the case in 1922.

The weather during March 1923 was considerably drier than the 20-year state average for that month. The total rainfall for April was about normal but there was a relatively large number of days in which some rain fell. The general rains of May set in on the 2nd or 3rd of that month and continued for four or five days. This rainy period was followed by about a week of rainless weather after which general rains again set in. During these two storm periods-spores of the melanose fungus were liberated in large numbers.

Usually a slight amount of fruit infection develops in March of each year and a little more takes place in April, but for the most part general infection of commercial importance does not occur until May. Last year was no exception to the rule although the April infections were a little heavier than usual, due to the rather large number of rainy days during that month. Prior to the on set of the May rains the fruit was commercially free of melanose but heavy infections occurred

throughout the citrus belt during the first rainy period of May. By the middle of May most of the spring fruit had reached an age which rendered them immune and further infections did not develop.

In order to determine how successful growers had been in their attempts at checking melanose we visited 52 groves during the late summer and made careful counts of fruits in sufficient numbers to be quite representative for the grove. Similar counts were made in unsprayed groves as well. The groves in which these counts were made are located throughout the citrus belt from Hastings on the north to Ft. Myers on the south. In making these counts the fruit was abritrarily divided into six grades. These grades were as follows:

1. Fruit with no trace of melanose.
2. Fruit with a very slight amount of melanose.
3. Fruit with a slight amount of melanose.
4. Fruit with a moderate amount of melanose.
5. Fruit with a severe amount of melanose.
6. Fruit with a very severe amount of melanose.

In many packing houses the first three grades, would be classed as brights. In most packing houses the first two grades would be considered brights or better. However, for this discussion fruit free of melanose and fruit with only a very slight amount of those blemished will be considered commercially free of the disease. The composite data from these counts were tabulated and carefully analyzed but only the summary will be given at this time. The summary is as follows:

Of the 52 sprayed orange and grapefruit groves 59 per cent of the fruit was commercially free of the disease, whereas the unsprayed groves had only 2 per cent commercially free—a difference of 57 per cent in favor of spraying.

Of the 21 sprayed orange groves 62 per cent of the fruit was commercially free of melanose, the unsprayed groves had only 2 per cent commercially free—a difference of 60 per cent in favor of spraying.

Of the 31 sprayed grapefruit groves 56 per cent of the fruit was commercially free of melanose, and the unsprayed groves had only 2 per cent of the fruit in the same class—a difference of 54 per cent in favor of spraying.

It was also shown:

That wherever groves were sprayed during February or March for scab control, and with no subsequent fungicidal sprays, melanose was reduced, but not as much as by early April applications.

That groves sprayed during the first half of April for melanose control were not nearly so well protected against melanose as were the groves sprayed during the latter half of the month.

That the 15 groves that received the most protection only *one* was sprayed before the middle of April.

That in general the most effective spraying was done just before the May rains set in.

That spraying done after the May rains set in did not afford a satisfactory protection against melanose

That home made Bordeaux mixture plus standard oil emulsions gave better results than did the commercially prepared Bordeaux plus the same emulsions. Where the commercial product was used in amounts sufficiently great to make a 3-3-50 dilution the commercial product gave about as good results as did the home made Bordeaux.

Many growers use the commercial products at such a rate as to give a 2-2-50 Bordeaux mixture in the diluted spray with very unsatisfactory results. The same strength home made Bordeaux would very probably have given equally unsatisfactory results.

CONCLUSIONS

From the results obtained by growers in 1923, which confirm the findings of the three preceding years, it would seem that citrus melanose usually can be controlled satisfactorily by a single application of Bordeaux oil emulsion made before the on set of the May rains. This is a matter of especial significance when it is realized that an economical spray schedule for the control of most serious diseases requires many years of experimentation.

Member: When is the best time to spray this year?

Mr. Winston: As soon as you can. Just ahead of the May rains.

Member: What effect will that have with the citrus or lemon scab?

Mr. Winston: On fruit that is susceptible to scab, it give protection for two or three weeks, or until the grapefruit is about three-quarters of an inch in diameter. When larger than that it would be no use to spray.

Member: Should one spray more than once?

Mr. Winston: I don't think I would.

Member: How long after the Bordeaux Mixture is applied would you put on straight oil?

Mr. Winston: Last week in June.

Member: Would it be possible to combine any other spray with the spray for melanose?

Mr. Winston: I don't know.

The Possible Relationship of Die-back to Fasciation in other Plants

T. J. Harris, Winter Haven

Mr. Chairman, Ladies and Gentlemen:

As you know, die-back is of some importance in Florida, and I thought perhaps I would give you a brief outline of a new idea, an idea which is absolutely new not with a view to usurping the function of the Experiment Station, but with a view to assisting them in their work. The title is "The Possible Relation of 'Die-Back' in Citrus to Fasciation in Other Plants." I think you will find items there that will remind you of cases of fasciation that you have yourself noticed.

In presenting this subject I am well aware of the fate that awaits any departure from the beaten track; it is therefore suggested that these notes be regarded as observations submitted to my brother horticulturists in the hope that the subject may receive further attention at hands much abler than mine.

It is proposed that an attempt be made to show that a fairly wide range of plants, when affected by fasciation, exhibit symptoms similar to those of a citrus tree afflicted with "die-back"; if this can be successfully done then an important step has been made towards throwing new light on a phenomenon in citriculture upon which even our most eminent authorities have agreed is not due to fungus or bacterial disease.

The term "fasciation" is derived from the old Latin word "Fasces" which, according to the Standard Dictionary, was the name given to "a bundle of Elm or Birch rods bound together by a red thong and containing an axe head with blade projecting from the side, and carried by lictors as symbols of power before kings and emperors, consuls and proctors." The same authority gives "fasciation" as "a malformation in plants in which they assume a flat or ribbon-like form: It may be produced by the flattening of a single stem or branch, or by the lateral union of several stems." Again, a "fascicle" is "a cluster or bundle, as of leaves, flowers, or stalks, which proceed from a common point. "A bundle cluster, or group." It will be recalled that the Italian "Fascisti" was a group with authority proceeding from one person, the Dictator. In anatomy the "fascia" is a bone of the foot which spreads out into five points towards the toes.

These definitions being not entirely adequate for our purpose it will be necessary to examine instances among familiar plants in which fasciation is noticeably manifested: The normal plant of Celo-

sia plumosa grows to a height of about four feet and consists almost entirely of a large plumosa head of myriads of little flowers; and may be seen at its best in the parks and gardens of the Northern States and Canada: A fasciated form of this plant grows about a foot high and is known as the "Cocks-comb." The fasciation in this instance has been fixed by seed selection, though every batch of seedlings yields about 50 per cent that revert to the original plumose form. The cocks-comb Celosia is characterised by flattened stems bearing crests of multiple distorted spikes of flowers, the outer ones of which always turn down. Several near relations of this plant may be found in fields in Florida, often exhibiting fasciation; among these are the "Careless" weed and the Spiny Amaranthus, as well as a common purple stemmed weed that is related to the Four O'clock and Bougainvillea.

The immense size of some of our strawberries is due to fasciation of the fleshy receptacle; the real fruit, of course, being the tiny nuts imbedded in it; the flattened stem may often be observed back of the over-large fan-shaped strawberry and the outer edges of the cocks-comb-like fruit turn down. In the second year, if the plants are carried over, the fasciation often extends to multiple buds or crowns, which produce a large number of small leaves but no fruit. Fasciation has not been observed in its near relatives—the blackberry and the wild Rose.

During the fall our roadsides may be found covered with a small yellow-flowering weed of the family Compositeate; out of the millions between Winter Haven and Arcadia I found two plants showing pronounced fasciation; one of these was near Brownville and the other near Eagle Lake. The stems were flat and ribbon-like, several of the deformed shoots at the centre of the crest had died and the outer ones were turned down towards the stem. A relation of this plant inhabiting the Northern States and Canada in dense masses, the "dandelion", is sometimes found to be fasciated; and still another, the Chrysanthemum, in both these, however, only the flower head and its stalk is fasciated and not the plant itself. Among our shrubs the double Jasmin often produces fasciated terminal shoots and flowers, and when Jacobinia coccinia is grown in the full sun-light practically every flower spike is faciated; while in the shade they are normal.

On a small island some five hundred miles east of Savannah, where Easter Lily bulbs are grown for the Florist trade of America a fasciated Lily is occasionally found showing extraordinary fasciation; the stores there exhibit a picture-postcard photo showing a plant with 240 small lily blooms as against 8 or 9 in the normal plant. It will be noted that the Lily plant proper remains underground as a bulb and that the part showing is really only the flower spike, whose scales have developed into functioning leaves; though it is but transient, serving one season only.

The fasciated Lily has a flattened stem four or five inches wide at the top surmounted by a crested ridge of numerous small flowers, the uppermost and central ones being disrupted and decayed; and the two outer ends of the crest turned

down towards the stem. The Easter Lily is not alone in the family of Liliaceae in being subject to fasciation for it has been observed in the Hyacinth and also in the Aloe; the latter not to be confused with the Agave or "Century Plant," which belongs to Amarydideae.

Two out of the seven varieties of pineapples appear to be subject to fasciation, namely, "Smooth Cayenne' and "Red Spanish"; the fasciation runs true to form—a fan shaped fruit surmounted by a crest of innumerable small "tops" packed closely together and the outer ends of the crest turned down towards the stem. A good many years ago I sent to Florida from the West Indies for a consignment of Smooth Cayenne Suckers to supplement the few at the Experiment Station; quite 75 per cent of these produced fasciated fruit which were, of course, of no value as fruit, but proved later an excellent supply of propagating material. I remember an advertisement by a Florida grower who stated therein that his plants were not allowed to fruit but were grown exclusively for suckers. By planting the suckers from these imported plants in comparatively poor gravelly soil the fasication was eliminated in the second year and the innumerable tops eventually grew up into plants that behaved perfectly. Showing that my friend's methods were sound and that a pine grower can choose between an abundant supply of strong suckers with *useless* fruit and a moderate supply of suckers and *good* fruit, by moderating the supply of available organic nitrogen. It might be noted in passing that practically all the relatives of the pineapple live in the trees and on telegraph wires—examples of which are the Florida "moss" and the other "air" plants, sometimes erroneously called Orchids, and are not accustomed to being provided with an excessive supply of nitrates.

It will be seen then that quite a number of the flowering plants are subject to fasciation but it is not altogether absent in the non-flowering plants; the created ferns such as Adiantum gracillimum cristatum, a maiden hair fern, and Nephrodium Molle cristatum are examples; and even as far back in evolutionary development as some of the mosses, fasciation makes its appearance.

It was on the small island previously referred to that the writer observed the greatest number of instances of fasciation; and the opinion was formed that its appearance was induced by the sudden change from poor growing conditions to those conducive to rank vegetative growth, in the presence of intense light; intensified by reflection of the sunlight by the calm ocean. Or, it may be, the refraction of the light by excessive atmospheric moisture changed its effect upon the chlorophyl of the foliage, bringing out fasciation where it was inherent.

On one occasion a plant of the common Bougainvillea glabra exhibited one of its flowering branches badly fasciated, as also did a large tree of the "China Berry," Melia Azadarack; and in this connection it will be remembered that the Navel orange originated on one branch of a sweet seedling tree at Bahia in Brazil.

The failure of the Navel orange to produce seed, except under conditions

most conducive to reproduction, as opposed to conditions which favor vegetation, has been sometimes attributed to the fact that no pollen is to be found in the flowers; it is well known, of course, that the orange is one of those fruits whose development is independent of pollination. It is pointed out, however, that our few scattered Navel trees are generally surrounded by trees producing immense quantities of pollen, and the ease with which citrus trees cross-pollenate is equally well known. It is suggested that it is more reasonable to assume that there may be fasciation, or a similar disturbance, present in the pistil of the flower, which prevents fertilization; and which develops later into the "Navel," bearing all the ear-marks of a fasciated placenta, or "rag" as it is commonly known. When it is remembered that the fruit of the orange, botanically, is made up of five modified leaves, joined rather precariously together, it is precisely there at the apex that fasciation, if present, is most likely to manifest itself; though it has been suggested that the navel is another whorl of modified leaves within that comprising the orange; as in the doubling of a flower, but it is an indefinite multiple group of whorls each member of which is capable of growing out into a complete orange consisting of five connected modified leaves.

That heredity is a factor in fasciation has already been seen in the case of the cockscomb seedlings of Celosia plumosa; that fasciation can be perpetuated vegetatively is shown by the pineapple and the strawberry; but perpetuation by budding or grafting has not been demonstrated, except in the one hypothetical case of the Navel; and this would have to be supported by actual experiments with fasciated Bougainvillea and Chinaberry budwood on stocks propagated from their normal branches. Notwithstanding this exception, wherein this particular character is retained through indefinite buddings, it would seem that fasciation may be regarded as a recessive character, latent in certain species, varieties, and individuals; but the manifestation of which is induced and maintained by abnormal conditions; and it would be curious if the Mendellian law were to be found to apply to vegetative reproducton, for second year strawberry plants with multiple buds or crowns seem to occur in the field in Mendellian ratio comparable to what would be expected in the case of the cockscomb Celosia seedlings.

At this point it would be well to invite attention to several instances where citrus trees have exhibited phenomena that bear a suspicious resemblance to same, if not all, of those set forth in the foregoing notes:

1. Near the residence of one of our prominent pineapple growers not far from Fort Pierce, is a large Lime tree which, while bearing a fair crop of limes, is nearly always afflicted with Die-back; with multiple buds, the outer shoots distorted and turned down towards the stem, gum pockets sometimes present, and the shoots at the topmost central branches bursting and staining. About twenty yards is a row of seedlings almost as large, raised from seeds saved from the limes borne by this tree; fifty per cent of these seedling trees suffer from die-back.

It is true that these trees are quite close to the sea and consequently exposed to intense refracted light and this may have something to do with their condition; but half of them are normal!

2. A few miles south of Kendal is a large orange grove planted in the rock of that neighborhood and has done well for the past five years; a year ago last summer at the time of the "big water," "die-back" suddenly appeared in the grove and in six weeks fifty per cent of the trees were affected; there were no apparent reasons why they should not all have die-back, as the conditions were exactly similar throughout the grove. No more than these fifty per cent were subsequently affected and recovery occurred when the heavy rains farther up the state ceased and the "big water" no longer brought excessive supplies of plant food to them through the rock strata.

3. Near Winter Haven a three year old grove of Valencias on rough lemon stocks had been apparently abandoned for a season, for some reason or other; in this grove were a few trees showing all the symptoms of die-back. One of these trees had grown up several stout shoots from the lemon stock, which occupied quite two-thirds of the tree; the shoots were free from die-back, while the bud looked like a deformed inter-polation; with its flattened or angular shoots, multiple buds, and outer branches turned down towards the stem.

Our citrus growers of Florida are quite familiar with the symptoms of die-back and can, at will, produce it in the grove; and as readily cure it; either by reducing the percentage of organic ammonia in the fertilizer or applying blue-stone, or both; but then not all the trees would have die-back; some would french and become ammoniated, and their fruit would split, and drop prematurely. It is not necessary, then, to proceed farther than to suggest that in view of the observations herein set forth it is permissible to submit that a close resemblance exists between the symptoms of die-back in citrus and those exhibited by other plants affected by fasciation.

That these observations may not be regarded as of purely academic interest, but may assume economic importance, is evidenced by the instances of the strawberry and the pineapple; and the thought presents itself that since two-thirds of the oranges shipped from California are from trees that have been perpetuated purposely from a single branch of the Bahia tree, apparently affected with a form of fasciation, it is possible that bud-wood was inadvertently taken from a tree or trees, far back in the beginning of the industry, that were subject to die-back when assailed by abnormal conditions. This suggestion will no doubt add to the considerations involved in experiments on bud selection, which may, indeed, extend to *tree* selection, after subjecting a number of them to die-back conditions; using stocks propagated by cuttings after *their* trees have been similarly selected.

In some respects fasciation occupies in botanical science a position somewhat similar to that occupied by cancer in medical science; very little research work, however, has been done on fasciation.

This is largely due to its comparative unimportance, from an economic standpoint, in the agriculture and Horticulture of temperate countries and even in tropical areas. It will be conceded, however, that Florida is exceedingly individualistic, furnishing unusual problems in plant life that are of considerable interest; I may be pardoned, therefore, for inviting attention to a curious phenomenon that may, indeed, have its place in the future development of our greatest industry.

A Survey of Citrus Products

Milo R. Daughters, Haines City, Fla.

Historical. For more than twenty years investigational work has been carried on in connection with the utilization of citrus culls. The earliest attempts were made in southern California at National City, Pasadena, and Redlands. At Riverside a plant was erected to manufacture peel in the crystallized and candied condition. These first plants were all obliged to close their doors owing to the onesided nature of their manufacture, poor management, or lack of sufficient capital. Repeated attempts to produce a by-product from citrus fruits have been made in Florida. At least two attempts have come to the speaker's attention to produce grapefruit juice in merchantable quantities; one at Haines City by the Florida Fruit Products Company and the other at Miami by The Polk Company. In the former case a very elaborate building was constructed, admirably adapted for the preparation of juice, but it failed largely because the manufacturers did not know how to clarify it so that it would remain permanently clear and because it is impossible to make a success of fruit juice alone.

Factories have been constructed in Florida for the purpose of making marmalade, jams and jellies. These have failed for the simple reason that it is cheaper to buy the citrus fruit in New York state at ten dollars a box and make the marmalade right at the market's door than it is to ship the glasses to Florida and manufacture the product where the fruit grows and then ship it back again to the market.

The canning of grapefruit has been hailed as perhaps the most successful outlet for grapefruit aside from the fresh fruit. Until the summer of 1923 the market was making one mad scramble for canned grapefruit. As a result of the market conditions numerous inexperienced canners went into the canning of grapefruit. Only one thing could happen—failure. Two failures happened at Stuart in one season. The plants at Eagle Lake and Orlando did not operate and so far as information is at hand the plant at Clearwater did not turn a wheel, during the season of 1923-1924. Some of the Porto Rico packers have been offering their canned product at a figure below cost of manufacture producing thereby a demoralized market. The present state of the canned grapefruit market is due to two causes, viz: the attempt on the part of a number of packers to get out from under or, stated in another way, the lack of co-operation in marketing and

to the inferior quality of the product placed on the market.

Essential Oil. This is the oil occuring in the outer surface of the peel. It is prepared by distillation under high vacuum and by cold pressing. Hand pressing is resorted to where labor is cheap such as in Italy. Cups, lined with sharp elevations, are used for puncturing the skin. The pressed oil is more highly prized. A large New York concern is quoting lemon oil at 75c per lb. in 100 lbs. lots and orange oil at $2.75 in like quantities.

The orange contains from 0.13 to 0.53 per cent oil by weight. Hood of the United States Department of Agriculture obtained from 4 to 5 ounces of oil to 100 lbs. of culls. He also constructed a peeling machine which had a capacity of 2 tons of oranges or 3½ tons of grapefruit per hour. Apparently this machine has not been a commercial success since it is not in use.

Grapefruit contain 0.4 to 1.1 per cent oil, but at the present time it is not a commercial product.

The Glucoside or Bitter Principle. Grapefruit contain from 0.2 to 1.6 grams of glucoside or bitter principle, called naringin, to each fruit. It is more bitter than quinine, but does not have any of the medicinal properties attributed to the alkaloid, quinine. It has a solubility of 1 part in 8000 of water. It contains the sugar radicles of glucose and rhamnose. its formula is C_{21} H_{26} O_{11}. 4 H_2 O At temperature above 175 F., it decomposes.

Pectin. Grapefruit is the richest of all fruits in this constituent. It comprises about 10 per cent of the fresh peel by weight according to one investigator. It occures chiefly in the white rag and cores. It is easily extracted with water and is used in the preparation of jellies and jellified jams. Its preparation on a commercial scale is a complicated proposition and one which requires rather expensive equipment. Eventually, however, this is destined to become one of the chief products from citrus fruits.

Candied Peel. Approximately seven million pounds of citron are imported into this country annually. Peel from citrus fruits are easily impregnated with sugar and make a very good substitute for candied citron. Grapefruit peel is thick and will absorb a large quantity of sugar. In commercial practice the thicker the candied peel the higher is its market value.

Canned Grapefruit. In this connection the speaker can not resist the temptation to quote from the "Proceedings of the Florida State Horticultural Society for 1923." On page 90 of these Proceedings we find the following statement "With reference to canning grapefruit there is no secret about it; it is very simple. If one has clean utensils and a good reliable thermometer, he can can grapefruit. There is scarcely a grower in the State of Florida who will not be able to use all of his culls by putting them in cans and making an A1 article, as has been said. This industry is destined to be the greatest industry in the State of Florida." Again in the issue of March 3rd, 1923 of the Florida Grower you will find the statement by a man of prominence in the affairs of the state that it is not a difficult

matter to get experienced help during the grapefruit canning season and that the cost of erecting a factory is a mere bagatelle.

These references are cited to show that nothing could be further from the truth and to explain why the canning of this product has met with so many failures and has come into such disrepute. This is another illustration of where promoters and the unsophisticated have preceded scientific research.

Citrus Fruit Juice. So far no successful results have come from attempts at the preservation of the juice of any except lime juice. It appears that there is a possibility for grapefruit juice. Attempts to bottle grapefruit juice have failed because of the one-sided nature of the business and because of the appearance of a sediment upon standing. Grapefruit juice is not an attractive or appetizing drink no matter how it is prepared.

These fruit juices are of value because of their laxative properties, their mineral salt content, and their antiscorbutic action. Osborne and Mendel of Yale have shown that grapefruit juice contains as much Water Soluble B Vitamine as an equal volume of milk.

Orange juice has found an outlet in the preparation of vinegar where it is now successfully produced at San Dimas, California. Vinegar may be made from grapefruit juice by re-inforcing the sugar content, but the finished product still has the bitter flavor.

Citric Acid. This chemical is now produced in large quantities on a successful commercial basis in Southern California from lemons, the juice of which contains from 5 to 6 per cent citric acid. The juice is boiled with infusorial earth and filtered clear after which it is precipitated as the citrate of lime. This insoluble precipitate is mixed with water in the proportions of 1:10 and an equivalent amount of sulphuric acid is added. This releases the citric acid and precipitates the calcium as calcium sulphate which is removed by filtration and the clear dilute solution of citric acid is then concentrated in vacuo and crystallized.

At the present time it is not economical to produce citric acid from orange or grapefruit juices, because of their low acid content.

Seeds. The seeds of citrus fruits are rich in oil, which is somewhat similar in appearance to olive oil and in properties to cottonseed oil.

The following table shows the percentage composition of the seeds of grapefruit and oranges together with the outstanding physical and chemical properties:

	GRAPEFRUIT SEED		ORANGE SEED
	Per Cent	Per Cent	Per Cent
Water	10	11	11
Oil	31	41	42
	Liquid at Zero	Solid at Zero	
Saponification No.	197	201	196
Iodine No.	96	101	101
Maumene No.	64	61	62

The Satsuma Industry of North and West Florida

E. F. DeBusk, College of Agriculture, Gainesville

The satsuma industry of North and West Florida, as we know it today, is only about three years old. While there are several small groves of trees seven to fifteen years old scattered throughout the counties of North and West Florida, the first carload shipment of satsumas was made from Cottage Hill, Escambia County, last fall. Plantings of the last two years have been limited only by the number of available nursery trees. The present acreage is estimated at around 8,000 acres, distributed from Duval to Escambia counties, with the counties of Escambia, Jackson, Bay, and Santa Rosa comprising around seventy-five per cent of the total acreage.

The satsuma on trifoliata root stock is adapted to a wide range of soils found in all of the North and West Florida counties. It seems to be equally at home on the heavy clayloam soils of Jackson and Escambia counties and the sandier soils of Bay and Walton. The rolling pine lands with yellow sand to clay subsoil two to three feet from the surface seem to be best adapted to its growth and the production of fruit of the highest quality. The lower lands, including the best grade of flatwoods, are suitable to the production of satsumas when properly drained.

At the end of the year 1923 many growers feared that the satsuma industry of North and West Florida had been growing too rapidly for the best interests of the industry. It was observed that many growers, with their enthusiasm for this very promising industry, were planting larger acreages than they could care for properly. This enthusiasm was cooled to the safety point by the freeze of last January 5 and 6, when a minimum temperature of 12 F. was recorded at different points in West Florida. This gave growers an opportunity to take stock, and taught them a few very important lessons.

Soon after the freeze it was learned that some groves were damaged much more than others, even in the same locality and of the same age. Also it was learned that individual trees within a few feet of each other were unequally affected by the low temperature. Growers began to discuss these conditions among themselves and look for the causes of same, with the result that facts very important to the future development of the industry were learned through very striking demonstrations.

In the first place, the effect of the low temperature referred to impressed grow-

ers with the fact that the satsuma needs protection against occasional low temperatures to make the industry safe. How to obtain that protection is answered in part through the experiences of last winter, when it was learned that the following factors have direct bearing upon the cold damage done to satsuma trees: Banking the trees, tree pest control, age of root stock and bud when transplanted, method of cultivation, method of fertilizing, location of grove.

Perhaps the most serious mistake made by the satsuma growers in the section referred to was in failing to bank or mound their trees before the freeze last winter. Many trees that were killed by the freeze could have been saved by banking a few inches above the bud union; the higher, the more bud saved. In Bay and Walton counties most of the trees were banked and saved; in other counties, only a sufficient number of trees were banked to make a striking demonstration of its advantages in protecting the trees. The lesson has been learned, and hereafter satsuma growers as a rule will bank their trees in November and leave the banks up until March, repeating this operation each winter until the trees are about five years old.

The fact that a satsuma tree sapped by whitefly and scale insects through the fall and winter is unable to withstand the cold along with trees free of these pests was very clearly and forcible demonstrated to a large percentage of the satsuma growers during the past winter. This lesson will make it easy to encourage growers to establish the practise of spraying their trees and will be a long step in the direction of quality fruit as their trees come into bearing.

Experiences of the past winter have taught growers that it is wasteful, as well as a handicap to the progress of the satsuma industry, to bud match-size seedlings and to transplant dormant or very small buds from the nursery to grove form. Loses in numbers of trees has run very high in such plantings. The shock of transplanting is too great, besides they are too small to receive proper attention in grove form. Growers should insist on seedlings being around pencil size, at least, before they are budded, and should arrange with nurserymen to carry these small buds over another growing season in the nursery row.

In many cases growers cultivated their trees too late into the fall and winter, thus stimulating growth and preventing trees going into natural dormacy for the winter. In such cases the cold damage was very severe. This practice is accounted for by the fact that almost every grower desires to produce a larger tree at a given age than the other fellow. Also development companies are anxious to make a big showing in tree growth and often over-stimulate the young trees.

Some trees suffered severely from the cold on account of not having sufficient quantity and quality of plant food during the last growing season to properly mature the growth and maintain normal vitality during the severe test of the winter. A few growers use fertilizers too high in nitrogen content too late in the growing season. This, combined with too much fall and winter cultivation, prolongs the fall growth too far into the win-

ter and produces a very undesirable condition for a low temperature. The best practice is to plough the grove as soon as the trees go into dormancy, working the cover crop from under the trees and into the soil, leaving the surface clean and undisturbed during the winter. Leave off fertilizers and cultivation that stimulate growth after the middle of August. However, more data is needed on the problem of fertilizing for frost protection.

Growers have learned that more attention should be given to the selection of the grove site, especially with reference to air drainage, water drainage, and soil. More thorough preparation of the soil before setting the trees is being stressed.

As a rule the satsuma grower is interested in producing fruit of quality. The leaders in the industry are keeping the importance of quality ever before the masses. They are striving to establish and maintain the highest possible standard of quality for the satsuma in the markets. Having only one variety—the Owari—and one root stock, and having the natural conditions favorable for the production of high quality in texture, flavor and color, the problem of standardizing grades and pack will be easy, with the splendid spirit of co-operation that prevails.

The satsuma industry of North and West Florida is destined to be a very important part of the great citrus industry of the State. The development of this industry will bring about a very desirable balance in the horticulture of the State and will tend to broaden the vision and unify the political interests of the people of this great commonwealth. The citrus fruit growers of Central and South Florida offer every encouragement to their brother growers of the North and West and solicit their co-operation in solving the common problems of profitable citrus fruit production for the general good of the citrus industry of the State as a whole. With the arrival of the golden, delicious, satsuma upon the citrus markets of the country, the suicidal practice of shipping green fruit from Central and South Florida will automatically stop forever.

While a good many satsuma trees were killed by the cold of last January and many others were injured more or less, the development of the satsuma industry of North and West Florida will continue to go forward. The industry is more deeply and securely intrenched than ever before. Optimism prevails throughout the satsuma belt. The bankers and other business men have a vision of a great citrus industry for that part of the State that will bring a substantial revenue to the growers of that section as well as to the State of Florida. Vision and work added to nature's gift will make the industry a success.

The Satsuma in West Florida

George Huelsbeck, Cottage Hill, Fla.

When first asked for a paper on Satsumas in West Florida, by Secretary Floyd, I hesitated for some time before replying for a very good reason. The reason still exists, but I have decided to show the spirit of optimism that prevails here in spite of the severe set-back that we have received from cold damage this past winter.

The Satsuma has just passed through the most severe weather that a citrus tree has ever been called upon to endure. With an early fall which caused trees to go dormant at an early date, many with late growth incomplete, followed by a mild winter with night temperatures above the sixties the latter part of December and the day temperatures in the seventies, we experienced on January 6th, a drop in temperature in twenty-four hours to the low point of 13 degrees above zero, accompanied by a sixty-mile wind. In twenty-four hours, we were transported from the temperate climate of Florida to the severe cold of Alaska, and naturally we wondered what had happened to us. Previously we had had low temperatures, one of 14 degrees above zero in 1916, but no serious damage had resulted. In fact, we had had a crop the same year. We have had other periods of low temperatures that have defoliated the Satsuma trees, but nothing that could compare with the one that visited us this season. Satsuma trees were growing here that had passed through the winter of 1898, when the temperature at Pensacola dropped to 10 above, and there was snow on the ground for two days, but the Satsumas came through with flying colors. But this season, with conditions absolutely against us, the first period of cold being followed in two weeks by one almost as severe, and for two months following continued low temperatures permitting no recovery until the present time, I feel that the Satsuma has passed through the most severe test that it will be called upon to withstand.

Approximately 100,000 trees have been planted in Escambia County in the past five years, and as many more in the adjoining counties. A recent survey of the groves in these counties shows some startling results which may be far-reaching in their effect, and great lessons may be learned from them for the future care and cultivation of the Satsuma tree. It is still too early for a correct estimate of the damage to the various groves, but it is safe to say that the loss will run from 1 to 50 per cent, and on the surviving trees much of the wood will have to be removed. One fact stands out clearly.

The groves that had received proper care and cultivation, and that were free from scale, came through with very little injury; but practically every tree that was infested with purple scale is dead, almost without exception, proving that purple scale is the worst enemy of the Satsuma that we have to combat.

It is safe to say that 99 per cent of all the scale insects and mites have been killed by the freeze and subsequent loss of foliage, and that even scab infestation has been reduced to a minimum, so that it should be years before insects and diseases will really be serious again.

The plantings here have not been large, usually from one to forty acres, and nearly every land owner having a grove of some size or other. Some of the growers are discouraged, but for the most part they are optimistic. The industry has been on a rather haphazard basis, with little attempt at systematic spraying or cultural methods. Those who wanted to give their groves every attention had no place to turn for information and help as the Experiment Station knew little of Satsuma culture, and it has been only by actual experience and hard knocks that success in any measure has been achieved.

Considering as very significant the fact that the groves that had been properly cared for, sprayed, fertilized, and cultivated, had received only minor injuries such as the loss of some small branches and defoliation, and after taking stock of the situation since the freeze, the growers, business men, and the general public are all of the opinion that the Satsuma is here to stay. The groves are being fertilized, cultivated, and sprayed, the injured wood pruned off of the surviving trees, dead trees removed and arrangements made to rebud the C. T. root-stock (which has not been killed) as soon as it sends up shoots that may be budded. It is believed that with one good growing season the surviving trees will have recovered sufficiently to produce a normal crop; the rebudded trees should be producing in three years, and it is only a short time until West Florida will again be producing on a firm basis, that most delicious of citrus fruits, the Satsuma Orange.

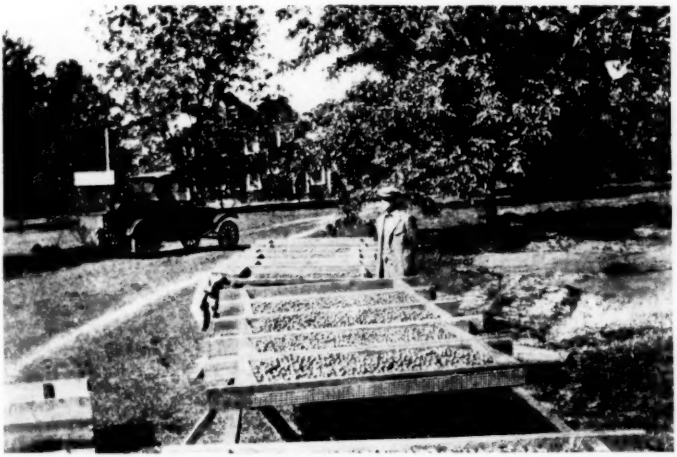
It is a well known fact, and the growers of round oranges concede the point, that the Satsuma has an advantage over other oranges when it comes to marketing. It is early, being tree-ripened in October, it is beautiful to look at, and it sells on sight. It peels as easily as the Tangerine, is seedless, and has great keeping qualities, in addition to being of such superior flavor that one has only to hand one of these oranges to a visitor to convince him forever that it is the fruit for him to grow. And the place for him to grow it is West Florida.

In recognition of the good qualities of the Satsuma, our favorable location in respect to markets (being 30 hours from Chicago and 25 hours from St. Louis), and the present low price of our lands, companies are being formed, land is being cleared and prepared, and the planting of Satsuma trees will go on at an undreamed-of rate. I venture to say that nurseries growing the Satsuma trees are completely sold on Satsuma stock. Mil-

lions of trifoliata seed are being planted, hundreds of little nurseries have sprung up, and many of the companies expecting to plant, are growing their own trees because of the difficulty in securing trees for their needs. The course of the next five years will see millions of Satsuma trees planted.

With the lessons learned from the cold this season, with the complete recovery of the larger parts of the bearing groves, with the large plantings that are contemplated and the capital that is being expended for that purpose, with the complete confidence of the growers and the general public, the future of the Satsuma is indeed bright, and West Florida can feel entirely justified in using the term that been adopted for her, namely *Satsumaland*.

A FLORIDA PECAN ORCHARD



DRYING RACKS FOR PECANS

The Pecan Industry in Florida and its Possibilities

G. H. Blackmon, Pecan Culturist, Florida Agricultural Experiment Station

The pecan, a native nut bearing tree, stands highest in the estimation of those who know it. The pecan nut has a higher food value, according to investigators, than either the walnut, filbert, cocoanut, almond or peanut. The nuts are continually being put to new uses, and with the large shelling plants that are beginning operations to take care of the smaller nuts (both seedlings and the under grades of the named varieties) there will be a continual expansion of the consumption of meats. This, together with a satisfactory system of marketing and distribution of the nuts will take care of any production.

Although not native to Florida, the pecan thrives and makes a rapid growth in many of her soils. The number of varieties introduced from Florida and the success with which some of them have developed in different sections of the country, are living testimonials to the adaptability of our soils and climate to the growing of pecans. The following are some of the varieties introduced from Florida:

Bolton, from Jefferson County.
Bradley from Baker County:
Curtis from Alachua County.
Kennedy from Alachua County.
Moore from Jefferson County.
Hume from Alachua County.
President from Duval County.
Randall from Alachua County.
Robinson from Orange County.
Waukenah from Jefferson County.
Seminole from Jefferson County.

There are others and new ones are constantly being introduced. Two promising new varieties are the Simmons (Syn. Pride of Oakhurst) from Duval County and the Farley from Jackson County.

The Curtis, introduced from Orange Heights by Dr. J. B. Curtis, is a remarkable variety, in that it seems to adapt itself to many different kinds of soil and climate. Reports from other states, even from California, are that it is behaving the same as it does in the home state.

When properly cared for, trees make an exceedingly rapid growth in Florida, and the long period of years that is often required to bring them into bearing in the native seedling states, is obviously not so necessary in our climate and soil conditions. The writer has seen orchards composed of three and four year old trees that were beginning to bear, and it is not uncommon for trees five years old to bear nuts. Commercial crops should be produced in from seven to ten years after planting the trees.

Pecan trees, though they may some-

times seem to be a little slow to come into bearing, will offset this time by the number of years that they will bear fruit. In the native pecan belt there are seedlings that are several hundred years old. There are seedlings in Florida that were planted from seventy-five to one hundred years ago, and they are thrifty and bearing heavy crops of nuts. While pecan trees will stand much abuse, they will, on the other hand respond very readily to a correct and systematic plan of orchard management.

All over the central, northern and western portion of Florida the traveler is impressed with the fact that pecan trees are found growing around many of the homes. These trees are nearly always in or adjacent to the yard and lots. In most instances they are fruiting profitably, and not infrequently the owner will point proudly to a tree with the statement that it is "paying the taxes" or that it is helping very materially to pay this or that bill that is always being incurred on every farm. For the most part these small home plantings are seedlings, some of the trees as much as seventy-five years old, but in many instances known varieties have been planted. Again, there are those places where the seedlings have been top-worked to varieties of known worth. In the northern and western portions of the state, in addition to the above, there are to be seen commercial plantings of pecans ranging from a few acres to a thousand or more in one orchard, composed of trees from one to thirty years old. Apparently the most successful orchards are those smaller ones of thirty or forty acres or less, as it is possible for the grower to give more individual attention with this size than with the larger ones.

The December crop report of the United States Department of Agriculture for Florida gives the production of pecans for 1923 at 1,215,000 pounds, compared with 786,000 pounds for 1922, 1,025,000 for 1919, and 307,632 pounds for 1909. Thus the production for 1923 was nearly four times that of 1909.

The March crop report for Florida gives the number of bearing trees at 138,000, compared with 113,547 for 1920, and 42,512 for 1910. While no figure is given for trees of non-bearing age, the total is probably 275,000, with a comparatively heavy planting of young nursery grown trees during the past season.

The number of pecan trees of bearing and non-bearing age as well as the production and value of the nuts for all the states reporting pecan trees in 1920 and 1909 are given in the table on page 147, taken from the Fourteenth Census of the United States.

It will be noticed that there were at that time a total for the United States of 2,672,136 trees of bearing age, and 2,257,236 not of bearing age, with a total production of 31,806,771 pounds. Compare these totals with those for 1910, which were as follows: 1,619,521 trees of bearing age; 1,685,066 trees not of bearing age, with a total production of 9,890,769, valued at $971,000. A large number of the trees shown in this report are seedlings, due to the fact that the native pecan belt is also included in the figures. The increase was due largely to increased plantings of improved varie-

STATE	CROP OF 1919 No of trees Bearing	Not bearing	Pounds	Value	CROP OF 1909 No. of trees Bearing	Not bearing	Pounds	Value
Ala.	176,426	257,671	1,179,735	$ 353,924	44,683	125,734	228,341	$ 30,540
Ark.	19,233	26,860	348,382	87,106	13,958	13,811	249,955	17,603
Fla.	113,547	208,613	1,025,673	307,705	42,512	176,207	307,632	43,962
Ga.	444,722	654,281	2,544,377	890,535	75,519	325,779	354,046	47,845
Ill.	25,289	6,024	182,347	45,592	28,330	8,225	107,069	10,301
Kan.	29,193	8,440	252,802	75,841	27,716	2,797	20,583	1,462
La.	94,513	101,285	2,242,859	672,962	36,527	119,547	723,578	70,635
Miss.	129,971	254,187	1,559,245	389,823	60,524	148,030	637,293	79,936
Mo.	85,434	31,891	555,184	166,561	48,822	7,214	147,420	10,467
N. C.	17,470	37,227	145,763	43,736	6,876	20,871	74,861	8,194
Okla.	400,480	108,650	4,296,642	859,331	96,766	53,796	894,172	59,481
S. C.	58,025	90,025	525,783	157,734	33,366	43,639	159,823	20,442
Tenn.	4,127	7,002	70,594	17,654	2,037	3,309	25,581	2,566
Texas	1,045,694	449,464	16,755,421	3,686,191	1,087,619	621,550	5,832,367	556,203
Va.	12,452	3,897	33,927	10,184	868	2,337	10,568	1,356

ties. With an increase of trees of bearing age in other states equal to that in Florida there should be a considerable increase in the production. However, reports from the great seedling belt of Texas place the 1923 crop at around 9,000,000 pounds, a much lower figure than that of 1919. Our information is that the production of nuts of the named varieties has gradually increased. The production in Florida is not what it should be per tree, but it compares favorably with that of other states.

In a general way it can be said that the section of Florida best suited to pecan culture is from Jacksonville west to Pensacola and south to Gainesville: To be sure there are plantings located in other parts of the state, but as a whole this will take in most of the successful orchards.

The pecan is filling a place in the horticulture of Florida that has long been needed. It is bringing satisfactory returns to a section of the state that has long wanted such a crop. When an orchard is composed of the right varieties and is properly located and cared for the yield is very satisfactory. Owing to the fact that pecan nuts are not perishable the grower has a longer time to market them.

One thing that has hurt the pecan industry in Florida has been the promotion of large developments that were not planted and cared for as they should be. Then again, many people think that when a soil has been impoverished by the continuous growing of farm crops that it can be planted to pecans and the trees will make a rapid growth and soon develop to such an extent that a large crop of nuts will be produced annually that will sell for a handsome price. But such is not the case, for pecans require a fertile soil to produce the crops of nuts that are expected, and if the soil is not fertile it must be made so by the application of the proper fertilizer and the turning under of cover crops. The Florida Agricultural Experiment Station is conducting a number of fertilizer experiments with pecans on different types of soils, looking to the determination of the food requirements of the pecan.

The 1923 crop was not absorbed as readily as it should have been, due largely

to the fact that in the past pecans have been considered to be a nut for the holiday trade only. But just as soon as the masses are educated to the value of this very excellent nut as a staple food, and the place it should have in the regular diet, then the marketing problem will be solved to a very large degree. It will then be a question of storage and distribution, for shelled meats as well as the nuts will be consumed throughout the year. Your attention is called to an article in the American Nut Journal for March, 1924, by J. M. Patterson, President of the National Pecan Growers' Association, in which he discusses the marketing problem that is facing the pecan growers of today. He makes some pertinent recommendations and has laid down a policy that is well worth considering by all who are interested.

The pecan has its insect and disease enemies the same as other fruit bearing trees, and in this connection the Florida Agricultural Experiment Station is working on methods of control that will assist the growers to successfully combat the pests.

The returns from the pecan nursery stock produced in Florida are probably equal to those from the nuts. At any rate, a very important part of the industry is the propagation and growing of first class pecan trees, and it will continue to be. There is a most wonderful growing condition in the state, one that will produce a marketable pecan tree in a comparatively short time. Many soils of Florida produce a well-branched root system, something that is hard to get. It is safe to say that Florida nurseries are shipping pecan trees into every state in the Union, even into Arizona and California. At any rate their stock is going to all of the states planting pecans commercially.

What about the possibilities? Are they unlimited? What does the future hold in store for the pecan grower? This one and that one speaks of over production and the saturation point. What will it all lead to?

The possibilities of the pecan industry are almost unlimited. There is an ever increasing demand for pecan nuts. Shelling plants are cracking hundreds of thousands of pounds annually the meats being used by confectioners in large quantities. They are also put up in vacuum cans and jars as well as being disposed of in bulk to be used in various kinds of cooking. The meats are being used more and more in American homes in the regular diet.

Pecan nuts will be bought in increasingly large quantities by varieties, the same as are apples, peaches, plums and other fruits. People who become accustomed to eating Schley, Curtis, Stuart, Pabst, or some other variety having good quality, certainly does not want a Teche or a seedling of poor quality. When buying by variety the consumer will know what to expect when the nut is cracked.

As to over production this will not be reached if the people are educated to the many uses to which pecans can be put, and if there is a satisfactory system of distribution. There are millions of people who know nothing about the wonderfully fine flavor, quality, and high food

value of the pecan nut. They do not even know what it is like. A demand can be created that will absorb all the nuts that can possibly be produced in the future. The peach grower has the entire world as a market for his products. The English walnut production is around 50,000,000 pounds annually. It is not thought of as a holiday product. If such were the case the crop would not be absorbed. But by judicious marketing, walnuts are consumed throughout the year. Such should be the case with the pecan and the future holds in store just such a marketing system for the pecan grower.

As indicated in another paragraph the production of nursery stock in Florida is a very important part of the industry. This will go forward and keep pace with the industry in this and other states. Our nurseries will continue to produce pecan trees in large quantities that will take care of the demands of the pecan planters of this state as well as many of those in other sections of the pecan belt. Every nursery growing pecan trees should lay plans that will permit the expansion of that department of their business sufficiently to take care of the demands for stock in the future.

The pecan industry in Florida is a very promising one. It holds out great possibilities for those who go into it either for the production of nuts or trees.

Mr. Blackmon: (Following paper.) I was interested in walking down the street here to find on one of the fruit stands several batches of pecans, and they have a sign painted near those pecans that reads, "Fancy Georgia Paper Shell Pecans." I wonder how many of those were shipped to Florida from Georgia. There are many large shippers throughout Western Florida. While many of them are shipped direct, some of them are marketed through two exchanges, one the National Pecan Growers Exchange, and the other the Southern Pecan Growers Exchange. I was just wondering how many were grown in Florida, shipped to the Exchange, and reshipped to Florida, and the seller is calling them Georgia Paper-Shell Pecans.

One thing I would like to leave with you is that the Georgia-Florida Association meets in Albany the early part of June, and the National meets in Cuthbert sometime this Fall. I think Florida should have a large delegation at those meetings, and I would like to see a good exhibit of nuts that are grown in Florida.

Grape Culture in Florida

E. L. Lord, College of Agriculture, Gainesville

Your esteemed president has placed me in a curious position by asking me to discuss the general topic "Grape Culture in Florida." I am much like the inoffensive by-stander who interfered with an Irishman and his wife when they were having their usual daily row.

There are many individuals who repeat in all seriousness that the grape industry is capable of the same development in Florida which the citrus industry has made. Then there is another group who say that there is not and cannot be a grape industry in Florida. I recently heard two horticulturists solemnly assure each other that there was at this time no grape industry in Florida; although to spare my feelings, which they thought might be hurt, they agreed that it was barely possible that one might be developed. As far as I can ascertain neither of these gentlemen at that time had ever seen a bearing vineyard of Munson Hybrid grapes in Florida. Why is it that there are so many that are unduly pessimistic, and why are there so many who believe that we must seriously reckon with grape culture in considering the future horticulture of Florida?

Let us see if we cannot find upon what grounds these men take such conflicting positions. Taking the negative side first we find that many experiments were carried on with European and northern varieties of grapes during the last decades of the nineteenth century. As a result of these experiments it was found that diseases and insects shortened the life of the vines and injured the product so seriously that grape growing was financially a very undesirable proposition. During the same period the Munson hybrids were developed, but were not thoroughly tested in Florida.

The production of the Munson Hybrid varieties made it possible to avoid the worst pest of the grape in the South, phylloxera, as these vines have a high resistance to the attacks of this insect. A varying resistance to the mildews and anthracnose is found in these grapes, and it is possible to control by spraying the diseases which affect the appearance and quality of the fruit as it arrives upon the market. Dr. Rhoads will tell you in detail about this type of spray, which I can assure you is making it possible for Florida grapes to arrive on the market in first class condition.

Besides the important fact that table grapes have been produced in moderate quantities and have found a brisk demand in local and northern markets which were hitherto bare, there are other factors

which have stimulated planting. The shorter time which elapses between planting and income; the rapidity with which nursery stock may be produced; the curious uses which are made of its by-products; serious sermons on citrus overproduction and diversification; the demand for quick action made by developmental agencies who wish to make raw land more salable; the ever-present spectre of frost and freeze damage to more tender plants; all of these favor the increase in number and size of vineyards. The dissemination of doubtful statements and heavy advertising of nursery stock do not make for a lessened interests.

Like any other horticultural industry, it has suffered much; conscienceless misnaming of varieties; heavy planting on poorly drained ground; exorbitant prices for nursery stock; extensive planting in untested areas; improper and unsatisfactory methods of pruning and trellising; insufficient and poorly understood spraying practices; lack of familiarity on the part of the grower with sound viticultural methods; wonderful scares about new and strange diseases; the usual crop of optimists and pessimists. Rather unfortunate for the reputation of many individuals for accuracy and careful statements of fact, the vines have gone on producing grapes that were more or less marketable, and the unfortunate consumer in the north with the inexpansible appetite for citrus fruits has continued to buy grapes which brought sufficient return to prevent, the grower from tearing up his vineyard and planting the area in oranges and grapefruit.

The primary cause of most of the troubles which the grape grower encounters in Florida is the fact that we have no fund of widely disseminated knowledge about grapes from which he may draw. Many who are somewhat familiar with grape growing in other localities transplant their advice freely without pruning, so that there has grown up a large body of misinformation about grapes in Florida. While Munson's Foundations of American Grape Culture is the only extensive treatise on this type of grape and its culture in the South, many of its recommendations do not apply to our conditions.

It may be of use to call attention to some of the most glaring mistakes made. It is doubtful if any vineyard will succeed on soils that are poorly drained, and it is practically certain that the life of a vineyard that is well cared for will be no longer than the time that it takes for the humus to be burned out of the soil. In consequence, a desirable grape soil should be well supplied with humus, and well-drained. Furthermore a large amount of organic matter should be added as often as possible either in the form of cover-crops turned under or in the form of stable manure.

The proper varieties to plant can only be found by experiment, either by the would be grape grower or by some one with experience with his locality and needs. Unless there has already been sufficient variety testing in his locality, he must do it himself. The anxiety of many to undertake large acreages in record time, makes them careless. As a result, large numbers of poorly selected

varieties are planted. We need a number of co-operating branch experiment stations to test out varieties in this state, but I fear that we have a hundred times too many, and that these are not as efficient as might be. Five vines of any one variety will supply as much information as five thousand.

The planting of vines too late in the spring is not a good practice. December is the best month for planting, and one year old vines should be used. These should not be allowed to dry out. Too many vines are lost by careless handling.

The planting of varieties that are self sterile either alone or with another variety on the chance that it will supply the needed pollen, is a risky proposition; yet this has been done in many cases. The planting of grafted vines produced by grafting varieties on the various wild forms of the grape, is also a doubtful proposition. In any case large plantings of this sort are only advisable if there has been sufficient preliminary work to assure success.

One of the most general mistakes is that of choosing the wrong type of trellising and training, and together with this a lack of definite ideas of the pruning requirements of the vine. Many of the various systems of handling the vine which will get by in other parts of the United States, result in absolute failure in Florida when applied to the Munson hybrids. The Munson system of pruning and training which was developed for this type of grape is by far the most suitable. In connection with this system it is unnecessary and wasteful to permit the vines to grow at will during the first season after planting.

Last, but not least, careless and insufficient spraying. The vine does not need more spraying than the citrus tree in order to produce good fruit, but it certainly fails to deliver fruit fit for shipping if spraying is neglected. It is not only necessary that the ordinary sprays be used in order to protect the foliage and developing bunches, but if the fruit is to arrive on the market in good order it should neither be covered with unsightly Bordeaux or be so badly attacked by fungi that most of the berries are shelled out and found in the bottom of the package.

It should always be kept in mind that the perfect commercial variety of grape for Florida conditions has not yet been produced, and in consequence it is important that the developing industry test out thoroughly any promising new varieties. It is also desirable that proper appropriations be made so that a plant breeder could be added to the staff of the Experiment Station, as our chief method of advancing in horticulture is by the production of new varieties of fruits which are better or different than those previously grown. It is unfortunate the production and dissemination of new varieties has been frowned upon, because of the abuse brought about by excessive claims and by speculative prices attached to the plant material, but this can be controlled. We must always keep in mind that the varieties of fruit for Florida's horticulture must be produced inside of

her borders, and the grape industry is not the only industry that is being held back because of the fact that plant breeding is insufficiently recognized. We must get away from this notion and realize that it is from him that we must look for the raw material for our future development.

Ripe Rots of Grapes and the Acetates of Copper as Non-Staining Sprays for Late Applications to Control Them

Arthur S. Rhoads, Citrus Blight Laboratory of the Florida Agricultural Experiment Station, Cocoa

In a number of states, but as a rule chiefly the more southern ones, grapes frequently are attacked during the ripening period by one or more "ripe-rot" fungi. These fungi ordinarily begin their attack when the grapes begin to ripen. Not only do they attack the grapes while ripening on the vines but they may continue their development saprophytically after the grapes have been harvested and packed for shipping, the rots being reproduced within a few days in sound berries coming into contact with the diseased ones. As a rule these "ripe-rot" fungi cause comparatively little damage during dry seasons, but if humid or rainy weather prevails during the ripening period, as is the case in Florida, considerable damage to the crop may ensue. Only a few days of favorable weather are required for ripe-rots to develop and, if infection of the grapes occurs, these rots may spread rapidly throughout the vineyard.

Three fungi are commonly responsible for the decay of ripening grapes. These are the so-called bitter-rot (*Melanconium fuligineum*), the white-rot (*Coniothyrium diplodiella*), and the same fungus (*Glomerella cingulata*) that causes the bitter-rot of the apple and the ripe-rot of a number of fruits. The decay of ripening grapes may also be caused by still other fungi but the three cited here are the most widespread and destructive.

Of these three diseases bitter-rot and white-rot are the most important because they often attack the stem of the cluster, its branches, or even the stalks of the berries before the berries themselves are attacked. In such case the stem or its parts become dry and brittle, as a result of which the berries depending upon the functioning of these diseased parts for their nourishment and water conduction quickly wither and dry up. Berries attacked directly by any one of these three fungi commonly develop discolored spots which quickly involve the whole berry. Later, minute pustules dot the surface of the berry more or less thickly and, if the atmosphere be not too dry, the characteristic whitish, flesh-colored or sooty-black spore masses are extruded from the pustules, the color of these depending upon the specific fungus involved. With the progress of the decay the berries become more or less shrunken and finally

dry up, although not to the strongly adherent, hard, coal-black mummies characteristic of black-rot. As a rule, however, infected berries have a tendency to shell or fall off at the slightest jar, even early in the course of the decay while the berries are still plump and juicy. Such dislodged berries may appear perfectly normal to the casual observer but a careful examination, especially with a hand lens, will reveal the presence of numerous minute pustules. Two or three days of incubation of such berries in a moist chamber usually suffices for the pustules to develop to maturity and the spore masses to be extruded.

The various "ripe-rot" fungi are a potential menace to the grape crop in that they attack the fruit at a time when spraying is no longer considered necessary for the control of black-rot, anthracnose and other diseases, and, in fact, at a time when applications of Bordeaux mixture are not even desirable because of the chalky blotches of spray residue left on the fruit at harvest time if applied within less than a month of this time. Control measures for the prevention of these diseases are difficult on account of the mature condition of the fruit at the time of infection. An application of Bordeaux mixture made close to the harvest season mars the appearance of the fruit and renders it unsalable. The prevention of these diseases therefore requires the substitution for the universally Bordeaux mixture of a fungicide that will leave only a very inconspicuous or colorless residue on the fruit.

When a fungicide forming very inconspicuous spots on the foliage or fruit is desired some one of the cuprammonium sprays or else Burgundy mixture generally is recommended. These fungicides, however, are open to serious objection because of their tendency to cause burning. Copper-caustic soda, in which the acidity of the copper sulphate is neutralized with caustic soda instead of with washing soda (carbonate of soda), as is the case in Burgundy mixture, also has been recommended where a practically colorless deposit is required. This mixture, however, has had but little trial. While neutral mixtures appear to be perfectly safe, strongly alkaline mixtures are liable to cause serious burning on account of the free caustic soda present. The point of neutrality can be determined safely only by resorting to chemical test or other indicator, which, although very simple, probably will not appeal to the layman.

The acetates of copper, on the other hand, form even less conspicuous deposits than the cuprammonium sprays and, for the equivalent amount of copper, are many times less injurious to the plant sprayed. They compare favorably with Bordeaux mixture as regards efficiency and effectiveness. They present in addition the important practical advantages of not burning the foliage, freedom from nozzle trouble, and are very convenient as regards the making up of spray mixtures since they require only mixing with water, without the addition of lime, carbonate of soda, caustic soda, and etc., to neutralize them.

While the acetates of copper have been widely used for many years in France, where they have been held in high esteem as fungicides, they have been employed

but little in the United States. In this country one rarely finds formulae for their use and, save for the work of Galloway, Shear and Butler, they are practically unknown. On the other hand, in all French text books from Viala's "Les maladies de la vigne" onwards, verdigris or basic copper acetate and, more recently, the neutral copper acetate are considered to be equal, if not superior, to the other copper sprays.

The acatates of copper may be considered under two headings:

1. Basic acetate of copper, or verdigris ("verdet gris" of the French), of somewhat variable composition but consisting mainly of bi-basic copper acetate and containing from 33 to 35 per cent of copper. The majority of the verdigris used in this country is imported from France, the method of manufacture consisting of corroding sheets of copper by the acid marc or residue from the wine-presses. Fermentation of the mass produces acetic acid, which, together with the moisture, forms a layer of verdigris on the copper. This is scraped off, washed and levigated. A better product is obtained by wetting cloths in vinegar or pyroligneous acid, and spreading them between the copper plates. The imported product usually occurs in small amorphous lumps of a blue-gray color or else in granulated form. Verdigris is the older of the copper acetates and at present the cheapest and most easily obtainable in this country. It has been quoted by one wholesale chemical company as low as 22 cents per pound in 220 pound barrels and 25 cents per pound in small lots, both prices being f. o. b.

In water the basic copper acetate or verdigris does not give a true solution as does the neutral copper acetate, but rather a semi-colloidal one. Upon stirring into a considerable amount of water the dibasic acetate of copper appears to dissolve completely but really splits up into a soluble part (neutral copper acetate), which colors the solution blue, and an insoluble part, which forms an inconspicuous, olive-green, flocculent precipitate. This precipitate slowly settles to the bottom but the slightest agitation again places it in suspension. It is this extreme lightness of the precipitate which insures the great freedom from nozzle clogging characteristic of verdigris mixtures.

In the European literature it is said to be necessary to soak verdigris in water for a few days before making up the spray solution, it being stated that it swells a little in water after a few hours as a result of hydration phenomena, forming a viscous paste, which, if diluted with ample water forms the bluish solution with the flocculent precipitate. With the imported prime French verdigris tested, however, no preliminary soaking was found necessary, the stirring of it into the required amount of water giving in a few minutes the blue solution with the precipitate in suspension in the ultimate form for spraying.

2. The neutral or normal acetate of copper ("verdet neutre" of the French), a salt of more recent introduction than verdigris and containing 31 per cent of copper. It is prepared commercially by dissolving verdigris, copper carbonate or copper oxide in acetic acid and evapora-

ting the solution. It may also be prepared by taking advantage of the double decomposition which results when lead acetate is added to copper sulphate solution. This is a crystalline salt resembling copper sulphate but with a greenish-blue color very similar to fresh chrome alum. It dissolves readily and completely in cold water, forming a clear, greenish-blue solution with a faint acetic odor. Being applied in the form of a clear solution, it insures absolute freedom from clogging of nozzles. While this spray is harmless to the foliage at the strength ordinarily used, it is probably more conducive to burning than verdigris, at least in wet weather. This is because drying of the solution is retarded and the salt, being soluble, acts corrosively. Upon drying, however, this unstable salt decomposes with the formation of basic copper acetate mixed with hydroxides. The extent to which this decomposition occurs depends on the temperature prevailing at the time the fungicide is applied, it proceeding more slowly and less completely in cold than in warm weather. The basic copper acetate decomposes even more rapidly and completely upon drying than does the neutral acetate.

The adhesiveness of the acetates of copper depends upon the degree to which they decompose on drying and upon the length of time that elapses between the time of application and the time of the first washing rain. As has been shown by Butler, the basic acetate it more adhesive than the neutral acetate and decomposes more rapidly upon exposure to the air than the latter. The adhesiveness and spread of the copper acetate spray solutions can be increased greatly by the use of gelatine, the greatest benefit resutling with the neutral acetate. As Butler has shown further, neutral acetate of copper plus gelatine is not as adhesive as basic acetate of copper plus gelatine, the inferiority being especially marked for periods following the application of the spray of less than 48 hours, but is so superior to the basic acetate without the addition of gelatine that it deserves to be introduced into our formulae as a substitute for use when the latter is not obtainable.

Applications of verdigris solution at strengths varying from 1 to 4 pounds to 50 gallons of water, made in a vineyard during the summer of 1923 gave every indication of constituting an excellent fungicide where it is desired to make late spray applications for the control of black-rot and various ripe-rots without marring the appearance of the fruit. Owing to the extreme dryness of the latter part of the summer and the comparative freedom from attacks by "ripe-rot" fungi, it is still somewhat uncertain, without further experiments conducted during a season more favorable to the development of these fungi, as to just what strength the copper acetates should be used to secure the maximum efficiency in the control of these rots without using an excessive amount of material.

Both the acetates of copper contain a higher percentage of metallic copper than bluestone or crystallized copper sulphate, the copper content of which is 25 per cent. The neutral acetate contains 31 per cent, while the basic acetate or verdigris contains from 33 to 35 per cent of

the metal. Since copper is the active fungicidal agent, it follows that the acetates of copper can afford equal protection in weaker mixtures than are needed if copper sulphate be used.

In France a 1 per cent solution of either of the copper acetates is considered to be as effective as a 2 per cent Bordeaux or Burgundy mixture. This would mean 4 pounds of the copper acetate to 50 gallons of the United States measure. The 2 per cent Bordeaux mixture standard in France is the 10-5-50 formula, based on the English gallon. This is equivalent to an 8-4-50 formula based on the gallon of the United States measure, which would be just twice as strong in copper sulphate as the 4-4-50 formula in standard use in this country, which is approximately of 1 per cent strength. From this it may be deduced that 2 pounds of copper acetate to 50 gallons of water would be equivalent in fungicidal value to our 4-4-50 Bordeaux mixture. Shear, however, who has made numerous grape spraying experiments in several states, recommends the use of 1 pound of copper acetate to 50 gallons of water. More recently, Butler recommends two strengths of copper acetates, namely 1 and 4 pounds to 50 gallons, the weaker for use in lieu of a cuprammonium spray and the stronger when it is desirable to use a colorless spray in lieu of Bordeaux mixture and of the same fungicidal value. Inasmuch as the copper acetates contain a greater proportion of copper—the active fungicidal agent—than does copper sulphate, the 4-50 formula would appear to be much stronger than our standard Bordeaux mixture. The writer is inclined to favor as a late spray for grapes the use of the copper acetates at the rate of 2 pounds to 50 gallons. While they may be used safely at twice this strength, the increase in the strength is not believed to be necessary for effective control of grape rots.

Stock solutions of the copper acetates containing 1 pound per gallon should be made up according to the quantity of spray solution desired. If the basic acetate or verdrigis be used the spray solution can be prepared in a few minutes by stirring the required amount of verdigris into the water. Solutions of the neutral acetate require somewhat longer to make as this salt occurs in coarse crystalline form like copper sulphate. If may be stirred in the water until dissolved, or the crystals may be suspended in a burlap sack near the surface of the water, following the procedure in common use when making up a stock solution of copper sulphate. No attempt should be made to hasten the dissolution by means of hot water since the salts will decompose and decomposition greater than that due to the hardness of the water should be avoided. The following amounts will be required for 50 gallons of spray mixture:

	Gallons
Water	48
Stock solution of basic acetate of copper (verdigris)	2

When gelatine is added to increase the adhesiveness, which is always required when the neutral acetate is used and which is decidedly advantageous even when the basic acetate or verdigris is used, the formula becomes:

	Gallons
Water	47
Stock solution of [basic acetate of copper (verdigris) or neutral acetate of copper]	2
Stock solution of gelatine	1

The stock solution of gelatine is made by dissolving 4 ounces of an inexpensive grade of gelatine in a gallon of boiling water. After cooling, this is added to the copper acetate solution previously diluted to spraying strength, stirring thoroughly.

An off-colored grade of gelatine known as "last run" gelatine can be purchased for as low as 35 cents per pound. Solutions of gelatine should not be made up very far in advance of using since they are very subject to putrefaction. In case they are not used shortly after their preparation it is well to add a small quantity of the copper acetate stock solution, say half a pint to 1 gallon.

Despite the greatly increased cost of the copper acetates as compared to copper sulphate the basic copper acetate or verdigris at least is by no means prohibitive in price when its value for a single final application on the ripening grapes is considered.

Blueberries in Northwest Florida

Carl B. James, Horticulturist, Louisville & Nashville Railroad

The beginning of the blueberry industry in Northwest Florida furnishes an interesting, even unique, bit of horticultural history. Starting with an individual who laid no claim to horticultural, or even practical orchard knowledge—a plain, Florida farmer—from an original planting of but few native or wild bushes, which passed for several years practically unnoticed alike by scientists and his credulous farmer neighbors, has more recently served as a foundation on which a most enthusiastic wave of development has been based.

Very briefly let us note some of the incidents in that development to date; a plain farmer near Crestview, some 28 or 30 years ago, brought from the nearby swamp borders a few blueberry bushes which he selected because of the character of the fruit they carried, planted them on his farm, gave them some cultivation and in the succeeding years found they were thriving under domestic conditions as well or even better than in the wild. From such selected wild material he added to his plantings from year to year, so that he now has bushes varying from 1 to 28 years from time of planting, and in size ranging in height from 1 to 20 feet, with spread of branch from 2 to 16 feet.

In something over 25 years, or from his first harvest, he has not had a single crop failure, and so far as his field operations were concerned, he has never sprayed nor dusted because he believes there have been no pests to contend with. His grove has passed through many winters, and oftimes when grove owners of other fruits may have been nervous over thermometers and smudge pots, he may have turned in his couch and snored as peacefully as his gray mule, being blissfully convinced that no cold injury would come to either his trees or fruit. His fruit has always been in greater demand than his supply could fill, so that he has been entirely free of a very vexations marketing problem. His operations at first were characteristically simple and crude as is well illustrated by the method, and type of container, employed in filling orders for shipment, in which he would cut from rough, undressed lumber,boxes of sizes sufficient to carry in bulk the various orders irrespective of whether they were 5 or 40 qts.

As far back as 10 or 12 years ago his operations were called to the attention of horticulturists in various parts of the country and through published accounts in horticultural journals; but nothing other than comment came of that.

Realizing what these native wild plants, when properly selected, and the fruit properly handled, might mean in a commercial way, some few years ago I began working with the native farmers themselves, citing this grower near Crestview, one of their own kind and in their own territory, as the example. The psychology of this line of approach, is readily apparent, and as a result, in just a few years time, there is now in West Florida alone thousands of acres of sour, so-called poor, land planted in blueberries.

And from that, interest has spread not only throughout the North Gulf Coast territory but far beyond, and millions of native plants have been sold. I am making no mention of the blueberry industry as found in Maine, Michigan, New Jersey or North Carolina. Time does not permit.

The term blueberry does not, unfortunately, have as distinct a meaning in our Southland as it should. It, as well as the term huckleberry, is here more or less indiscriminately applied to various members of at least two, possibly more, distinct botanical genera. The term blueberry might appropriately, as it is in some sections, be applied only to the various species and varieties of the one botanical genus *Vaccinium*, and the term huckleberry be applied only to the various members of the genus *Gaylussacia*. For the purpose of distinction, but without giving full technical descriptions, we may say that the fruit or berry in the Gaylussacias (huckleberries) has ten hard or bony seeds, that are large relative to the amount of flesh or pulp; while in Vacciniums (blueberries) the seeds are much more numerous, very small relative to the amount of pulp and almost unnoticeable when eaten.

In developing the blueberry industry in North Florida from suitable native plants, we are there concerned only with certain Vacciniums. We eliminate, because unsuitable, the deerberry or buckberry, the farkleberry or sparkleberry, and the Gaylussacias (huckleberries) which include the tangle or dangleberry. Some of the Vacciniums (blueberries) must also be disregarded as there are several species and varieties growing wild in that territory and unfortunately even then few from which selection for cultivation should be made are known in the different localities under different common names. Some of the names applied to these suitable varieties are: Huckleberry, high-bush blueberry, swamp blueberry, June blueberry, rabbit-eye and Arab. This is further complicated by the fact that the same name may be applied to different forms in different localities, and also some of the collectors who might wish to have it appear that they have a monopoly on something superior have coined brand new names, as cluster-tree blueberry, etc.

One must not assume, therefore, that he is safeguarded in getting desirable material if he orders from collectors of the native plants on the basis of name only.

Irrespective of what common names the wild plants, desirable for cultivation, may go under, or to what botanical species or variety of Vaccinium they may belong, the prospective grower should be concerned with getting only such plants

as will produce fruit that is worth while from a commercial standpoint.

Note in passing, in addition to the value of the fruit solely—the blueberry bushes are valuable as *ornamental* shrubs.

The transplantings in Northwest Florida have been almost entirely confined to the winter months when the plants were dormant. The collection of the wild plants have been largely of the *rooted suckers* having both upright or aerial stems one half inch or larger in diameter, and a portion of the under ground stem or rhizome. The purchasers of this wild material, in more than one instance, have been surprised to receive, instead of symmetrically formed small nursery trees, a bundle of what more nearly resumbled the shinny-clubs of their boyhood days.

Irrespective of claims to the contrary, it is quite impossible for collectors to make selection for desirable fruit bearing material when the plants are in the dormant condition. There is but one time in which to identify and select desirable plants and that is when they are in fruit. Collectors are advised, therefore, to locate and mark the desirable fruited plants by any scheme which will allow of no mistake later, making the transplantings in the dormant season or getting propogation material only from such postively selected stock. Anything less than that is but guess work irrespective of who the collector or what his claims may be.

Exacting of a guarantee from the collector that the plants purchased come only from material that had been identified while in fruit and selected on the basis of the fruit's desirable commerical qualities, is by no means asking too much, since it is the only safeguard.

The desirable commercial qualities in blueberries, especially those to be sold as fresh fruit, are: First, attractive appearance in which large size, uniform shape, light bluish color, due to the waxy covering or "bloom" on the darker skin are important; second, a good shipper, that is, does not wither or "go down" quickly. and lastly, of excellent quality and flavor.

Because these qualities are found in properly selected wild material native to parts of our North Gulf Coast, and because these native plants respond and do well under cultivation, and because the cultural details as well as the cost are quite within the limits of the native farmers, has made possible the inciting of interest and has given rise to the extensive plantings in that territory that are now under way.

Growing along with this highly desirable material there is, as already noted, much indifferent and worthless stuff and the purchaser from unreliable collectors of indiscriminate material is taking all the chances of becoming sadly disappointed.

The first of these requisites has already been sufficiently indicated. But I should note in passing, lest an incorrect impression be left, that in the enthusiasm to get started not all have held as closely as they should to the planting of only properly selected material notwithstanding the constant admonitions. As to the second, definitely recorded yields show that on the average from eleven year old bushes there should be a total of not less than 25 acres to assure car lot amounts for

each of the ten successive pickings in a season. The berries begin ripening in May and pickings will continue well into August. Similarly from bushes five years old, there should be about 65 acres, total, to assure the car lot movements. So that communities starting the blueberry industry should endeavor to have a total of about 70 acres to get the benefits, as early as possible, by producing, collectively, amounts sufficient to make up car lots.

As for the third general requisite, that is, cultural needs. In a few respects at least, blueberries are very particular. They positively require an acid or sour soil and will not succeed in a sweetened or alkaline soil or even in one that has but a neutral re-action. Much of the soils of the North Florida coastal territory fully meets this requirement, having specific acidity ranging from 3 to 30. Lime, in any form, should not be used in connection with blueberry soils. Blueberries need at all times the necessary capillary or soil moisture, but do not require a water-logged soil or one with standing water. In this respect an erroneous notion is often obtained by assuming that the plants growing wild in so-called swamps must necessarily have their roots always under water. This is not the case, as a more careful examination would reveal. Under North Florida conditions the particular blueberries that we are there promoting do best when planted on well drained, sour soil of specific acidity from 3 to 10, well supplied with decaying organic matter, and given frequent, shallow cultivation. The shallow cultivation not only helps to maintain the necessary capillary moisture but also aerates the soil which is a very important factor in successful blueberry culture. Where plantings are made by using the rooted suckers, as has been the more general practice in the Northwest Florida territory, such will carry with the roots the beneficial organism that seems to be necessary to effect the proper nutrition of the plant. The following simple and somewhat general directions have governed the care of much of the North Florida plantings, and may carry something of interest here.

In the selection of a site for a blueberry planting, one having good air drainage was preferable. Basins or dead-air pockets are as undesirable sites for the blueberry as for other fruits.

Preparation of the land in advance of planting include turning to a good depth and thoroughly pulverizing the soil by discing, harrowing and smoothing. While the turning under of a green cover in this advance preparation was not imperative, where it was included, decidely better results followed.

Because of the size of the mature high bush blueberry of the Gulf coastal region, planting distance should be not less than twelve feet each way, fifteen feet each way is a very satisfactory distance.

In transplanting, the roots should be protected from drying.

In setting the plants, have the hole large enough so that the more or less horizontal stem, rhizome, (often erroneously called the root) will be about six or eight inches below the level of the surface. This is deeper than the rhizome was positioned in the wild state, but it is

so placed as to permit shallow cultivation without disturbance.

During the growing season, frequent shallow cultivation should be given until the fruit is harvested, then seed the middles to a cover crop, preferably a legume, this all to be turned under in the Spring. In the young groves, cultivation need extend only about four feet on either side of the bushes, the balance of the middles may be sown to a summer cover crop to be turned under in advance of seeding to the winter cover. The growing and turning under of organic matter is a most economical as well as efficient way of producing both physical and chemical conditions in the soil essential to blueberry success. In addition to the organic matter turned under the blueberry has responded best where fertilization was given. As the fertilizer and soil treatment tests now under way are not yet completed it is too early to give exact data. In general terms we may say, that the fertilizer must not contain lime or any sweetening reagent, that the blueberry seems to do best where its nitrogenous food is derived largely from organic sources, such as velvet-bean meal, cottonseed meal, dried blood, etc. Fertilizers of about a 4-8-4 mix to a 4-10-4 mix have so far apparently been giving satisfactory response in the Coastal territory.

As for pruning, we need only say that at planting time any torn or splintered parts should be clean cut, and after setting, the upright stem if ¾ inch or more in diameter should be cut to about eighteen or twenty inches above ground, if about ½ inch or less in diameter, cut back to about ten or twelve inches high. In the bearing grove, and injured or dead stems should be cut out, and as soon as a stem becomes unproductive from old age it should be removed.

As this type of blueberry readily reproduces by stooling-out or forming rooted suckers from the underground stem or rhizome, a grower may enlarge his acreage by transplanting these, using only material from his best fruiting plants, in other words practice selection. The sale of these also offers a source of revenue. By such removal, as well as by the cultivation given the bearing grove, the size of the stools or spreading is held within desirable limits.

While other methods of propagation may be applied to the blueberry, most of these entail technical features that are beyond the average farmer. These very properly should be left to the skilled nurseryman, hence no recommendation along those lines are ordinarily given.

Because the blueberry thrives only on sour soil it thereby brings into profitable agriculture lands that are often regarded as practically worthless. In more than one section of the country has the development of the blueberry been wholly responsible for change in land value from near nothing to very handsome figures. In connection with the blueberry development now going on in the Gulf Coastal territory some very extravagant statements as well as misrepresentations have been made relative to what has been done in West Florida. The bare, unvarnished facts are sufficiently interesting, there is no excuse for either exaggerations or misrepresentations.

Returns the past year of better than $750 per acre from bushes of about six feet in height, for grove-run, ungraded berries at the average price of 25c per quart should not call for any exaggeration to appeal to any farmer of business intelligence. The prices for the West Florida berries this past season ranged from 20c to 60c per quart and the average yields from 10 year bushes was about 14 quarts per bush.

In the establishing of *commercial* acreages the problem of securing the necessary pickers has been raised as a possible obstacle. This of course, does not apply to small plantings that are not beyond the picking limits of the family members. The picking of blueberries has practically no objectionable features; no thorns, no backbreaking, no bending over, and no ladders to climb. It is essentially a girl's or woman's job. A good picker will gather from very favorable bushes about sixty quarts in a day, exceptional cases go higher, while the average picker under average conditions gathers about half that amount. Just as in every other fruit industry, the harvesting is an important problem, but it is no more unsolvable even in the large commerical acreages than it is with other fruits.

The blueberry as a commercial industry offers to the Gulf Coast territory today one of its most outstanding opportunities. Native to the territory are plants, when properly selected, that will produce abundantly one of the most delicious of fresh or preserved fruits. This industry is turning the so-called poor, sour lands into valuable properties. The proper culture of the native blueberry is not beyond the ability of the most humble farmer. The cost of developing a bearing grove is surprisingly small. Coupled with all that, is the great advantage this territory possesses, in that it can put its product onto the market well in advance of the sections farther north. The returns average up with those from the very best of other fruits. And the market for this early choice fruit is wide open, and as yet untouched.

Member: I would like to ask Mr. James if in the formula—4-8-4, ammonia comes first, and also whether the plant should be four to six inches—does that mean deeper than it naturally grew?

Mr. James: In the 4-8-4 formula the ammonia contents is given first, and in the case of a small plant it is four to six inches below the surface. That has no reference at all to what may have been the position in nature. You will find, if you examine the under-ground stem growing wild, it is above ground, and just between the leaves or leaf-mould.

The Florida Marvel Blackberry

Roland A. Nichols, Winter Haven, Fla.

The economic safety and well being of any community is made more secure when it has a diversity of productive vocations.

Many sections of our southern states were entirely given over to cotton growing. The inhabitants were "tin-canners" —not tourists, but regular settlers. Nearly all their food came to them in tin cans —they were dependent on other sections for their meats, vegetables and dairy products.

When the boll weevil onslaught came, wreck, ruin and despair prevailed, but some bold spirits began to try out diversified farming, stock raising and dairying under the guidance of county agents; others caught the vision until those once ruined, discouraged, cotton sections are now rejoicing in plenty, in a prosperity of which they had never dreamed. Some towns have erected monuments to the boll weevil, their greatest friend in disguise. To those of us who live in the great citrus sections of the state, the past two years experience and the present market situation has been discouraging in the extreme. This is the hour for the diversification idea, the avocado, grape, banana and blackberry propagandists find a ready receptive audience where a couple of years ago only bored, tolerant, superior, condescending attitudes would have greeted the diversification enthusiast.

For many years past, Florida devotees of blackberry pie and jam have tried in vain to propagate their old home favorites, the Lawton and Himalaya blackberries and several of their near relatives, but results have been "nothing but leaves."

About sixteen years ago, a Swedish woman living near New Smyrna, Florida, discovered a very superior blackberry growing wild in the woods in the midst of a jungle of ordinary wild blackberries. She noted the large size, prolific bearing qualities and the fact that the berries were almost seedless. The following year she was interested in finding her newly discovered blackberry friend again on the job, with an increase in the family. She had the good sense to dig up the plants after their fruiting season and set them out in her own yard, where they excited much comment, when they fruited again.

A couple of years later, Mr. W. E. Ballough of Daytona, Florida, a practical horticulturist, saw the new berry and realized, in a measure, its value. He propagated and observed it for several years. At that time he called it the "Eureka" blackberry, others called it the "Ballough." Then he sold plants to some of his neighbors.

About six years ago, Mrs. Quinn, a lady fom St. Petersburg, visiting in Daytona, bought a few plants from an Australian who had bought one of the farms where plants sold by Mr. Ballough had been set out. She took them to her home on the west coast where her husband became properly enthusiastic. He assumed that the Australian had brought the plant from his home country and so named it "the Australian Blackberry." Had he bought the plants from a negro, probably he would have named it "the African Blackberry."

When I bought my foundation stock at St. Petersburg two years ago, I suppose the so-called "Australian Blackberry" was a recent importation from that country and joined in the general chorus. About a year ago I learned the above facts concerning the history and origin, and called for a re-naming of the berry, giving honor to its native state. The name, The Florida Marvel Blackberry was the unanimous choice of the Florida Grower Committee, appointed to help settle the matter and this name has been approved and adopted by the state association of blackberry growers. In appearance, this fruit is very much like the dewberry, and the vine displays similar characteristics, requiring wires or trellis for support. In other respects, regular blackberry habits prevail. From the fact that the fruit is almost seedless—I have found as few as two in a large berry—and that the few seeds that do exist are soft and infertile, and that occasionally a plant appears producing a double blossom almost like a rose, but which will not fruit, indicates to my mind that we have a hybrid, a cross between the dewberry and the blackberry, but an improvement on both.

The Florida Marvel Blackberry begins to ripen in April and continues to fruit abundantly through June. By keeping back the new shoots that spring up from the roots, the season of fruiting may be extended until late summer for home use, but it will not pay commercially. When the fruit first turns black it is quite tart, but if left a day or so on the vine, will greatly increase in sweetness and size, averaging over an inch long. Last season when we had but few vines, we sold our berries in the local markets at thirty-five cents a quart, and could not begin to supply the demand. This season we have about four acres on wire trellis and plan to ship the bulk of our crop to the northern markets, through the Citrus Exchange and "The New York Auction," packing the berries in pony refrigerators, the same as strawberries.

We have had much to learn in the propagation of this fruit. Many have complained of losing a large proportion of their vines after planting; but upon investigation, it usually appears they have planted in the summer during the rainy season and have used sucker plants which have practically no root system, and which will probably live and grow if set out from September to April, but if planted from May to August will meet with possibly a fifty per cent loss. If the sucker plants are to be sold, they should be transplanted first and allowed to acquire a root system. Several nurserymen are potting their plants in tin cans. While this system beats the sucker plant idea, it has the disadvantage of binding and mating the root system if

the root cuttings are left in the cans for six months or more, and tin snips must be used to cut away the can before planting.

The layering system of propagation is not to be encouraged. It is a tedious job to take down the vines from the trellis, bury the tips at proper stage of maturity and after three or four months to clip them off and tie the vines up to trellis again. It breaks the branches, drains the strength of the vine and lessens its fruiting ability.

We practice two methods of propagation; our favorite being the Tubular polling system. In October or November, we take roots from strong bearing vines, cut them into two inch sections, and bury them in damp swamp moss until they start growth. To prepare the tube, we cut one-ply tarred building paper into strips 4x12 inches, bring the ends together and lap one inch and pin with wire finishing nails. We now have a tube 3½ inches in diameter and 4 inches deep. Prepare a rich seed bed, place tubes in rows on same and bury bottom of tube about one inch; fill with potting earth to ¾ inch of top; place sprouted root section in tube and firm the soil. Keep well watered, and as the plant grows, the roots will go straight down into the seed bed after moisture, instead of binding or matting is in a pot or can. When the plant is taken up, these long roots should be pruned first below the bottom of the tube. The moist earth will remain in place around the roots in the tube, keeping them from drying out or getting a set back by transplanting. Remove the finishing nails, discard the paper tube and set low on ridged land. Filament roots will spring forth from every pruned root and the vine fairly jumps ahead.

Our field grown plants are propagated from the same root cuttings planted in rows in seed beds, where they remain for about six months and grow a strong root system, and produce a vigorous plant that blossoms and bears a few berries the following April or May. Such a plant may be set out with success as late as June, and properly cared for should produce six to ten quarts of berries the following season, and fifteen to twenty-five quarts the second year.

Any good, well drained moist trucking land is suitable for growing the Florida Marvel Blackberry. On sand loam, the rows should be eight feet apart and the plants eight feet apart in the row. In muck soil, the plants should be twelve feet apart in the row. For trellising, we set strong posts, twenty feet apart on the row and standing six feet out of the ground, string three grape wires on same, two feet apart, wire car citrus box strips to top wire to keep hot wire from burning the vines and to keep the vines where they are tied with raffia, so they will not be blown into bunches and matted making picking difficult. Anthracnose sometimes attacks the plants. Bordeaux mixture is the remedy.

Some vines have double blossoms. They are usually the first to bloom. They are beautiful to look upon, but they are barren and will not fruit. They should be dug up and burned, root and branch immediately, as bees carrying pollen from them to the other vines as they begin to bloom will cause nubbin imperfect berries. Do not destroy a vine found

producing these nubbin berries. If the double blossom vine is destroyed so that cross pollinization cannot take place, the fruit will probably be all right the next season.

As the fruit is setting, occasionally a vine will be found that reverts to some remote ancestor. It blossoms profusely, but no fruit results. This vine also should be dug up and burned and new vines set where removals were made. After one or two seasons of watchful care, a uniform highly prolific bearing plantation will reward your efforts. When the fruiting season is over, all the old vines should be cut down clear to the crown and burned, care being taken not to break the new shoots which must be tied up to the trellis and which will produce next year's fruit crop. As to carrying qualities, I have made some very severe tests and find The Florida Marvel Blackberry will stand much more rough handling than strawberries and while I have not as yet shipped them to the New York market, I am confident they will carry well and arrive in good condition.

I showed some of my sample berries in preservative to Manager Miller of the New York auction. He said they would probably be in a class by themselves in May and should bring good prices.

To the man who has limited resources and wishes to make his home in Florida, but cannot afford to buy a producing citrus grove, nor wait to raise one, and who does not care for truck farming, the culture of Florida Marvel Blackberries should appeal. I see no reason why The Florida Marvel Blackberry should not win for itself a distinctive place in the northern markets and have a great commercial future, fitting well into the diversification plan, a source of blessing to Florida, a boon to mankind.

Experiences in the Growing of Mangos

J. W. Barney, Bradentown

President Skinner: One of the most interesting numbers on the program last year was that part covered by Mr. J. W. Barney upon the question of rebudding old trees, to new varieties. I don't know how many of you succeeded in carrying out Mr. Barney's instructions I tried it, and succeeded in only a very few cases. I think it was a little too late in the season. Mr. Barney is going to give us a paper today on "Experiences in the Growing of Mangos," and if any of you have any questions to ask on this proposition, it would be a good time to do it.

It is one of my keenest regrets that I haven't any confessions to make about shipping green fruit. This is about Mangos, and I don't see any way of getting on the sawdust trail, as some of my predecessors have had to do. Mangos are all the better if they are picked and shipped green, so in that respect they are a much more desirable fruit than any citrus. The gentlemen who have been on the program, so far have set a fine example, which lets me out of talking too much They have all of them read their papers; I will follow that splendid example.

Impressed with the fact that so few of our Florida growers carry on with more than the one crop, we are wondering when it will dawn upon us that the diversification of crops means as much to us as it does to other lines of farm production.

Citrus, with its sweetness of bloom, suggestive of love, and youth, and blissful hope, will always have its appeal, and, as a business proposition, lead in importance, both as to volume of fruit produced and capital invested; but, Citrus is becoming fickle at times with its lean years and hints at over-production; and these lean years, with their curtailed incomes, are suggestive of the wisdom, particularly for the small grower, of not carrying all of our eggs in the one basket.

Climatic conditions in Florida favor to a remarkable degree, the production of a variety of very profitable fruits in addition to Citrus—fruits which are in demand, and owing to the limited area in which these fruit crops may be grown, over-production is not likely. Avocados, Mangos, Bananas and other fruits invite attention, all of them alluring just at present in the time of sore trial with our beloved Citrus. These fruits, with Pecans, and perhaps some others, offer channels of relief to the grower who appreciates the importance of crop diversification and co-operative methods.

The topic assigned to me is of direct interest only to those living in the warmer

sections of our State, still, what I may have to say applies with equal force to all fruits and other farm products which, through proper effort, may be made factors of an assured profit, and more comfortable conditions of living.

In consenting to make this short talk upon the subject of Mangos it was with the understanding that technicalities, botanical and otherwise, should be omitted, so that the practical end of the matter could be gone into as far as the limited time given would permit. The title of this discussion should be "Mangos as a factor in crop diversification," and what we have to say upon the subject is based upon the crude experimental work we have been engaged in at our place at Palma Sola.

The subject of Mangos is an old one. It is as old as the hills of India, from whence it came. Ancient peoples have deified it, and it is embodied in their legend and song. It is from far off India that we get our finest strains of this "King of All Fruits."

The plant, while sensitive to certain climatic conditions, adapts itself to a wide variety of soils, and produces, under favorable conditions, immense quantities of fruit. In addition to its fruitfulness, it ranks high in the list of evergreen ornamentals. Its great drawback is its susceptibility to fungus diseases, the foliage bloom and fruit being affected. The fruit comes in endless variety, both as to appearance and edibility; the grafted East Indian varieties, most of them, being of very fine quality, while the common seedlings are good, bad and unmentionable. The fruit, if properly picked, is a good shipper. It is useful for human consumption under a great variety of conditions, green or ripe. In fact, if there is a more delicious or more adaptable fruit we have yet to hear of it.

Our personal opinion is that the Mango is about the most profitable fruit that we have, possibly not excepting Citrus or Avocado. We have never been able to fully meet the demands made upon us for it. Dealers come for it with their trucks, pick it, pack it to suit themselves, and pay us cash for it. The finer Indian varieties sell readily from the trees at fancy prices. These finer varieties weigh from half a pound to three pounds each. They may be eaten out of hand or, being free from fiber, served as a dessert and eaten with a spoon. The more fibrous seedlings, most of them of fine flavor are, it must be admitted, mussy—but, even they may be enjoyed with comparative safety at the time of the daily plunge in the lake or Gulf. The green fruit appeals to the small boy as does "the little peach of emerald hue," but cooked into an "apple pie" it is a wrecker of the Yankee pie eater's trust in things immortal. Preserves, jams, sauces, chutneys and salads are its attributes and the old Indian legends tell us of its use in concocting salves, ointments and soups; so we must conclude that from time immemorial the Mango has been taken seriously.

The question for the Florida Horticulturist is: Is it worth while to devote time and labor and loving thought in an effort at more fully adapting this most magnificient fruit to our Florida conditions? Our experiments on a small scale lead us to think that it would.

Mangos cannot be successfully grown in the open where low temperatures pre-

vail. Twenty-six degrees Fah., has seriously injured a few sorts at our place, but most of the Indian varieties and the large seedlings showed no signs of injury from this unusually low temperature. Of a number of trees sent us by the Department of Agriculture for experimental purposes fourteen years ago, some died, others grew luxuriantly and produced fine fruit. A few have grown into beautiful trees but without bloom or fruit. Some of these trees are blooming this year for the first time since we received them. The natural conclusion is that with our humidity and thin soils many of these trees do not feel at home with us. Some of the trees, as stated, produce fine fruit but with the exception of two or three of them they are all more or less subject to the disfiguring marks of blight. Of the two or three varieties which seem to be resistant, one the "Cambodiana," (from Cochin, China), heads the list with us. It is a bearer of medium sized fruit of very fine quality, but it lacks the red cheeked coloring which catches the eye of the novice. Once tasted however, all questions as to quality are satisfactorily answered.

We have grafted a number of these most promising varieties on seedling stocks, in some cases two or more varieties on the same tree. In some cases cross pollination is likely to occur giving us fruit, the seed of which may produce a tree that is adapted to our Florida conditions. What we have been able to do at our place, on our poor land, in a small way, is suggestive of the splendid results which are possible if the plant lovers generally would interest themselves in the matter. We suggest that you plant Mango seeds; seeds of the finer varieties if you have them; but plant seeds whether or no—and let them grow. They are the growingest things you ever saw, on poor land, on good land, in the pine scrub, in bunches of palmetto and, marvelous to say, under and in the shade of the ravenous Eucalyptus. They grow where Citrus perishes, where Avocados refuse to do well and where the ground is as bare of vegetation as the back of your hand, and most of them seem happy in the doing of it. May be it is because they have class and are aristocrats with a lineage reaching away back to the Garden of Eden.

Of course the little trees will appreciate care and an occasional square meal. As soon as they are big enough graft some of their branches with an improved near blight resistant variety. It is a simple matter and easy to do. In eighteen months or so you may have fruit from these grafts—fruit that is the result of cross pollination and more nearly a Florida product. Plant these seeds. Keep the pot a'boiling. A few years of this interesting work is pretty sure to bring results. To illustrate this take the Haden mango which is the son of "Mulgoba," than which there is nothing finer in the fruit line on the face of the earth. Haden has the fine flavor, the freedom from fiber and the beautiful coloring which gives it a place by itself—but, like its forbears and most other Indian varieties in Florida, it is addicted to the defacing anthracnose or blight. A few more developments along the lines of Haden may out-Haden the Haden. We need hardly expect absolute immunity from disease and insect pests. Citrus demonstrates that. Over-feeding, forcing, disturbs

physiological balance. The over-fed, over-stimulated man is subject to blood pressure and other ills, which indicate a lack of balance. So it is, we think, with the fruit tree.

I can assure you of one thing, your experimental work will be very entertaining and not without profit as the new fruits develop. And, who knows, your dream may become a reality and you will waken to the fact that you are an Exalted Grand Master who has put old Florida at the head of the list as the producer of the finest fruit that the world knows. It is the simple question of many hands, backed by a spirit of co-operation and unselfishness, making light work.

But I can hear you say, "We don't like fancy dreams, we are rather inclined to the hard facts." My answer is "come to my place and I'll try to show you," mango grafts eight or nine months old with bloom and fruit on them, real trees. Avocado grafts, Citrus grafts, Guava grafts on common seedling stocks big and little, growing on the poorest kind of land, and we will take pleasure in telling you how we have happened to do it so that you can do it yourself if you want to. We will also tell of the mistakes we have made—you know failures have value in sometimes being factors in bringing out the great truths.

Again you may say. "How about the profits?" "How does this wild eyed scheme of yours connect up with grocery bills and fertilizer bills and taxes?"

Our reply to this is in the shape of a true little story: Our small place at Palma Sola has lots of rosemary scrub—so, we call it "Rosemary." "There's rosemary, that's for remembrance. Scattered about on the place are a lot of old Mango trees, beautiful big seedlings. Last year we kept track of the fruit from these seedlings trees.

If we had a bunch of these trees grouped on one acre, and they had yielded as well as they did where they are, that acre would have paid us, net, about eighteen per cent upon a valuation of five thousand dollars for the acre.

You may draw your own conclusions.

Member: Mr. Barney didn't tell us how many trees he puts on an acre.

Mr. Barney: In that calculation about 40.

Member: How far apart?

Mr. Barney: About 35 or 40 feet apart.

Member: What methods do they use in grafting?

Mr. Barney: What is known as the proximal slot graft method. I tried to describe this method last year at the meeting of this Society. I was very enthusiastic about it, and those who heard me seemed to be enthusiastic too. As Mr. Skinner says, "Some of them tried it, and didn't succeed." Some of you have told me you did try it, and did succeed. It's a method that I will be very glad to give to you. It was the one described in the Florida Grower, and also in the Proceedings of the Horticultural Society last year, and illustrated. It is really a fine thing, and it would pay you all, who are interested in this matter to look into it, and try your hand at it. It's really fine.

Member: How important is it that the scion should be entirely covered by paraffin wax?

Mr. Barney: A scion is cut from a branch in short lengths and as considerable of that wood at each end is exposed, and there is likely to be considerable evaporation there, I think if there is no real damage done to the scion, just putting paraffin on the ends will suffice. In cutting those scions to make those grafts, I frequently cut what will do for sometime, and just as soon as I can after they are cut from the tree in the shape of a branch (you can cut a branch as big as your thumb, if you want to) I cut them into proper lengths, and immediately dip them in the paraffin. I have scions just as good now as they were two months ago. The paraffin seems to kill all germs or insects, and stops all evaporation, and preserves the life that is in that graft.

Member: Have you ever used the Cleft Graft on the Mango?

Mr. Barney: Yes, the Cleft Graft is all right, except that it's not so easy to bring the cambium edges in close contact, as it is with the other method.

Member: In small stock would it be preferable to the other?

Mr. Barney: I have done it both ways. I think as a matter of fact that the slot graft is particularly adapted to the very thick bark, in good sized trees. I think the Cleft Graft can be used to advantage on smaller stock, with the paraffin, of course. What I want to suggest is this: Last year I suggested using a knife to open up the bark beneath which the graft is placed. A handy tool is a putty knife. You can make an absolutely clean, straight cut with that. I have found since last year that in the hot summer months, the ordinary commercial paraffin, which varies greatly in its melting point, is likely to melt and run over the tree, and kill the bark if you get too much. We have found a way to correct that. Get a wax that has a higher melting point, and mix a small quantity; melt it, and run it to where you want it. We use Carnauba Wax. (Elbert & Co., 27 William St., New York.) It can be obtained in New York. Maybe you can get it in your home town. You take about two per cent to five per cent of that wax, and to that add your paraffin. The paraffin cools much more quickly on the graft, and when the graft begins to swell and bulge makes the edges crack and open up, so that the growth comes out of it.

Mr. Dade: Have you ever used Bees-Wax?

Mr. Barney: Bees-Wax is all right if you can make the scion grow. It's not as translucent as paraffin. One of the objects in using paraffin is to allow the sunlight to penetrate it, and in that way assist in healing the wound.

Mr. Harris: I happen to have seen some of the original Mango trees brought from India to the West Indies. There were a number of trees brought by Capt. Bly from India to Jamaica. They were all numbered, and they all died except No. 11, and that persists here in Florida. It comes from seed. I have heard that the Haden Mango has the reputation of being a particularly good variety, that also reproduces seed too, I have heard.

We had in the Experiment Station at Jamaica all the East India varieties, but the one we considered best was the Bombay Mango. I believe that the Haden

Mango is the best variety here. Its appearance is wonderful, and its flavor can't be surpassed. In Jamaica the country people travelled from the hills down to the plains, and brought back some Mangos. They threw the seed over the road, and Mangos are now covering the bare hills in Jamaica. The Government Inspection Station has taken over a large area of the seedling Mango, and they are making it over into the Bombay. I am sure they wish they had the Haden in preference to the Bombay.

In working over trees, there are three ways. You can cut down the main branches and wait for the young sprouts to come out, and graft as the oranges are done. Another way is to graft as Mr. Barney described, and the third way is to patch them into branches. I put twenty-five in one tree at one time. They all grew. It is the simplest way, and if at any time anyone wants to know how it's done I shall be quite prepared and pleased to describe it.

Notes on Avocados in Central Florida

John Morley, Lake Alfred

I have no excuses to make since I have had plenty of time to think this matter over and if I do not pen my thoughts correctly, I may be corrected. The foregoing salutation may be different to some of our valued speakers; nevertheless, I want as a leader, to say, that on the Avocado question today, we need state aid from the Agricultural Experiment Station but I shall refer to this later on. From experience, we are apt to get into that spirit of telling our neighbor what a "Gold mine" there is in the Avocado industry, but be assured there is always some difficulty to be overcome.

The term "Avocados in Central Florida" is rather a wide one and my remarks apply to the high pine land districts. By co-operation and through a free exchange of ideas relating to the Avocado in Florida I feel sure much may be done towards building up a prosperous sub-tropical fruit industry.

Let us think of its sustenance next, for here comes one of the great points which elevates it far above the majority of other fruits known. Its dietetic value is known to many and aside from the actual nutrients which it contains, lies its succulency, its mineral matter and organic acids and from which we learn quantities of water soluble vitamines are obtained.

Two years ago I spoke on this same subject and at that time we were passing through trials which occurred from various dry periods and although this may not seem so conspicuous to some I must say that in my opinion our Avocados received a great check on our high pine land and this has been more forcibly shown since that time. Last year we were favored with nice rains which put our trees in fine condition again; naturally in a large plantation we are apt to find a few which do not grow as luxuriantly as others and we are often asked the reason for this. Our expressions are in the first place that all trees when planted were of the same size and all planted exactly alike. I have carefully watched the progress of these slower growing trees and I am of the opinion after examining the roots from time to time that it may be probable in many instances that these occurrences are chiefly brought about through a bad root stock.

I am under the impression that the first six hundred trees which we planted in July, 1917, were budded to stocks which were from seeds picked up here, there and everywhere. Although we are apt to be over-exacting sometimes, I am of the opinion that great care is required to insure a fine seed supply and reliable root stock. Generally speaking I would se-

lect for our locality, stocks from thrifty bearing trees of Guatemalan or West Indian in preference to the Mexican, for the latter pushes forth growth much earlier than the former. However, it may be possible that a few of the Mexicans are not so early, but on general lines I am not convinced that it is as good as the two former for Central Florida. Perhaps I ought to mention that I have not proved if this is more drought-resistant than the two former named.

My observations lead me to say, that unless good food and plenty of water are given to these trees on our high pine land we cannot reasonably expect profitable returns for a long period of time. If we take into consideration a trite term given me one day by a friend, that these trees are a woodsy plant we may get nearer their requirements, for the so-called woodsy plant usually is one that although a little dry on the surface at times, we invariably find it has an even, cool root run.

In all our later plantings we have proved that after greater applications of decayed matter or decayed manure our trees have thrived more abundantly. For the welfare of the tree and as an active stimulus to all new planters it might be well to add that all newly planted trees should be regularly watered during the first year also that they should be shaded from the rays of the mid-day sun.

Much may be written and much advice given, but the main point is yet to come and I refer to the results of what fruit I have obtained and what other people have gathered from their young trees. The problem of non-setting, hence shy-bearing Avocados on young trees appears to be spoken of in many localities. Further it is not confined to our State alone but also in California where I have noted much comment on this matter. We are all experimenting, each one with a view that he may find out how to increase his crop by getting a better setting of fruit and so far there appears to be a great deficiency in our yields although our trees may have put out a good bloom. I have used all the sprays as recommended by Mr. Moznette and have experimented with light sprays of water on certain blocks also. My hives of bees have been increased but have as yet found no difference from those not treated; nevertheless I have still got a leaning towards increasing my bees again.

This non-setting of fruit through which I am passing must be brought out in order that we may try to help each other for although there may be some who might say that it would have been better if I had not touched on this point I feel convinced that if we will only be outspoken and more co-operative some assistance may be forthcoming. We are all working in our own way and naturally culling from one another in order that any success shall be ours.

This brings me to the point where I think we need some definite aid from our State Agricultural Experiment Station or from the United States Department of Agriculture. I have already received much valuable advice from these sources but I feel we have reached the point when you should join me in a body and say yes.

In order to obtain the best assistance whereby we can produce this valuable fruit in quantity it is necessary that our

Agricultural Experiment Station select for us their best investigators and give them the best opportunity to study our methods and requirements at regular periods after which a base line of methods can be decided upon. Of course there may be a few who think they do not require any suggestions but to those I would say do please work in harmony with the investigator who may call on you.

If we are to come out on top we must have more force and soon, for Florida has the land to grow this fruit in plenty and there is no excuse for our standing behind any state. Some of you may rise and say I have had this crop and that crop and have had good profit but what we should aim for is that co-operative feeling and seeing that all are succeeding.

We have several Trapps which were planted first, a few Pollocks and several other kinds, including some of the new Guatemalans collected by Mr. Popenoe. Also we have about forty Guatemalan seedlings collected by Mr. Popenoe and as the latter grow along I propose to commence experiments in root pruning certain trees. This method some years ago was proved conclusively to be well worth the money spent. In our large grove I am now working in other kinds, on every other tree and thereby endeavor to promote a better means of cross pollenization.

I trust that my endeavors of thought on this all important subject may be considered with care and thereby assist us all and for your courtesies I tender my thanks.

Mr. Thompson: Could I just read a paragraph here in reference to the ways of the Avocado, as given by Dr. A. B. Stout, who was in California and was invited by the California Association to study the matter:

The January Bulletin of the New York Botanical Garden contains some interesting notes on the flowering of the Avocado in California. Dr. A. B. Stout, while staying in California, was requested by the Avocado Association to seek the reason for the uncertain fruit of the trees which always flowered freely, and were apparently fertile. Assisted by the Pomona College, Dr. Stout discovered that Avocado flowers open twice a year. On the first occasion the pistil is in a receptive condition but the stamens possess no pollen. When the flowers open the second time the stamens are shedding pollen, but the pistil is dead. Consequently self-fertilized flowers are practically impossible. The different varieties are apparently of two classes. Class A opens some of its flowers in the morning, and closes them at noon, reopening them twenty-four hours later. In the late afternoon a second lot of flowers open for the second time. The other group, Class B, operates differently. Some of the blooms open for the first time in the afternoon, and open the second time on the morning of the second day, about thirty-six hours later. All the twenty-one varieties under survey behaved in one or another of these ways. Under the circumstances there is but slight or no chance of a variety in Class A fertilizing with others of the same class; consequently to ensure fruit, varieties of both classes must be planted together, in order that the opening of the pollen-bearing flowers may synchronize with those opening for the first time, and which are pistillate. It would seem that each group—Class A embraces some twelve varieties, and Class B nine varieties—do not vary much in the opening of their flowers. Therefore it is futile to plant any one or all of the twelve Class A in one orchard, as their flowers are all pistillate or staminate at the same time. For the same reason Class B varieties are also unsatisfactory.

Dull or wet weather rather upsets the sequence of the opening and closing of the flowers—may even reverse the order which obtains in bright weather. Only through this influence do Avocados set fruit, irrespective of whether both both classes of trees are near each other. For the reasons explained, however, the two classes should always be planted together. The why of such behavior is unexplainable, and so far as we are aware, no other species of plant follows so closely this policy of dichogamy.

Mr. Morley: I would certainly tender thanks to Mr. Thompson for his assistance. It is very fine and helpful to bring out this matter.

Mr. Skinner: Mr. Krome, have you any comments to make on this?

Mr. Krome: The work that Dr. Stout carried on in California a year ago last winter and spring was published fully in the California Horticultural papers, at that time, and Dr. Stout wrote several quite exhaustive articles on the subject of the different opening period of the Avocado flower. It seemed to necessitate the inter-planting of the Class A and Class B Avocados, and even with the best intentions in the way of inter-planting, it looked as though we were up against a serious proposition to bring about the proper pollination. At one time during the fall we made arrangements with Dr. Stout to come to Florida this winter, but were not able to perfect the arrangements in time to secure his services this year. Fortunately through the assistance of Mr. Robinson we secured the services of Mr. Savage, of Eustis, who has had considerable experience in that line, and Mr. Savage began his work near Homestead in February this year—about the time that the first Avocado bloom began to appear. He worked there most of the month of February and then returned the latter part of March and April to take up the later bloom varieties. He is completing his work there now, and while he has not assembled his data for a complete report I think I may be safe in saying that he has found conditions in Florida very different from what Dr. Stout found in California. I think he found practically no variety (between 40 and 50 varieties) but what gave opportunity of the opening of the flowers for close pollination. Evidently the conditions that exist during the blooming period in California are so markedly different that the results of Dr. Stout would be very misleading to the Avocado growers in Florida.

Mr. Skinner: May I ask a question? Over in Pinellas County we seem to find that a pretty good application of nitrate of soda at the blooming time acts very strongly in the setting of the crop. Have you had any experience with that, or have you any comments to make upon it?

Mr. Krome: I don't know; over in Dade County we think that nitrate of soda put on Avocados is just about the same as poison.

Mr. Robinson: I want to say in reference to that article by Mr. Stout, that some results were published in California which show it may not be altogether a normal condition in California. Orange Clarke carried on some experiments with somewhat different methods, by which he demonstrated conclusively that as long as he had bees operating among the trees he got good fruiting. I am not sure but what we may have similar districts in Florida where we have cross-fertilization, or the kind that Dr. Stout found; in fact, within the last two weeks I have tested out Avocado bloom in a number of places where the conditions were very similar to those described by Dr. Stout in California.

Member: How far apart is the best to plant Avocados?

Mr. Robinson: I think that is dependable on the location and soil.

Member: I live on Lake Magdalene,

north of Tampa, and my land is a little sloping west to east, it is flat.

Mr. Robinson: I should prefer planting in hedge row style, 25x15.

Member: What is the best? Open style or wind-break style?

Mr. Robinson: Open style.

Mr. Skinner: I think the Avocado is one of the most important subjects we have to consider. At Miami about three years ago I was in company with Mr. Krome and Mr. Hume and Dr. Fairchild. We went down to the Government Station and they gave me a couple of Avocados. I planted the seed as soon as I got home. One is 15 feet high and is full of bloom on half of the tree that I girdled in November.

Avocados

John V. Oberholtzer, Emeralda, Fla.

Sometime during the year 1915, I ate my first Avocado, I saved the seed and planted it upside down, with the result that the roots started from the top and went down and the top curved like a fish hook and came up through the roots. Right here, I wish to say that I have done other things with the Avocado since then that have been about on a par with the first seed planting, and think that we all do things in Avocado culture that can be left undone after we have learned more by experience.

I make cypress boxes a foot long, a foot deep and six inches wide, fill them with rich dirt, plant one Mexican seed in the middle, where the tree is to stay until transplanted, and then to save watering and other work, plant seeds in the ends of the box, but transplant these seeds into other boxes as soon as they show the sprout coming out their tops. Sometimes the top will sprout with very little if any root; while on the other hand there may be no top showing, while the seed has a tap root a foot long. In most cases, the root is much longer than the top. A tree should do better if the Avocado seed is planted where you want the tree to remain.

When the seedling is between the thickness of a slate pencil and a lead pencil, I bud them with a bud that has a good fat eye, if a well filled out eye can be gotten. The shield bud is cut about an inch and a half long, with a thin sharp budding knife that is kept clean by using a clean rag on it once or twice while working on one bud. During the last two years, I have bought black diving caps and cut them into strips and wrapped the buds with them, leaving the eye exposed after using a good deal of caution in wrapping to keep water from getting in around the eye. If the rubber will last, I leave it on for six weeks, but new rubber must be put on if the first decays before the expiration of the six weeks.

After the first six weeks, I generally re-wrap, but not quite so tightly, and give the eye more room. I then take off a little of the tree top, and if the bud looks all right, keep pinching the top back now and then, until sprouts begin to start on the lower trunk. When you make your sprouts start your bud should do something also.

I have but little trouble getting my buds to live six, eight or ten weeks, but after that time trouble starts. For my own use, I use a box a foot long, so as to have plenty of room for roots. I have lost a great many Avocado trees bought in boxes, that had but two or three inches for the roots from the trunk to the side of the box. After a tree has grown in

this small box, the roots become rather cramped, and twisted, and in order to get a start of straight roots I sometimes think that after the box is removed at planting, one should take a sharp butcher knife and cut off two corners that are diagonally opposite. The best plan is to re-box into a larger cypress box and keep the tree until some roots start out into the new dirt.

Before I plant, I dig a hole three feet or more deep, and put stable manure into it, keeping the manure about a foot below where the bottom roots will be when the tree is set out. This manure should be put in the ground quite awhile before the tree is planted, so as to get through heating, though it does not appear to hurt the tree to plant soon after the hole is finished. Nothing but top soil should be put into the hole.

When planting over dirt and stable manure that has been put into a hole three or four feet deep, one must estimate how much the dirt will settle into the hole, and plant the tree high enough to keep it from sinking deeper than it was in the box. If one should dig a hole into clay or other stiff land and put loose dirt into it to plant in, a reservoir would collect and hold water that would kill the tree. After planting a tree, the ground around it must be kept moist all the time. but not wet.

Some people have advised planting Avocado trees deep enough to have the bud union at the surface of the ground. I have quit that practice because it appears to me now to be a bad thing to do even where the more hardy types are on the tropical root.

The Mexican root is to the Avocado tree what the sour root is to the orange tree. It is easier to get tropical Avocado seeds than Mexican seed, and they are ready to bud sooner and are much easier to bud than Mexican, according to my experience.

Now, while the waters are up, we are not likely to have cold weather, that will kill the tropical part of the trunk that is under the hardy tree top. It may be as bad to warn planters against the tropical stock for Avocado trees as it is to warn them against lemon roots under orange trees; so I will not mention how poor a thing it is for one to do.

But, here comes an important point, and if you heed, you may save yourselves much time and cash. The idea that I wish to have you understand is that water kills avocado trees after they get large. I bedded up black land so as to get it four or five feet above water at the time, planted Mexican budded trees on it, and in three or four years had a good many of them twenty-five feet high. But the water came up on them and about the time they got to be ten or twelve inches through the trunk, there was not enough dry land to carry the tree. The favorite time for them to die quickly is when they are weakened by a big bloom. A small tree will stay alive under the same wet conditions. I have just lost fifty large bearing Mexican Avocado trees by water, where we had to dig holes for a year or more to get water out of the ditches, that were nearer the lake than the trees were. I think that a tree should be planted on land four feet above the very highest water mark to be found in its neighborhood, and I also think that if you plant nearer water than that, you run great risks with chances nearly all against you.

Sour orange trees live in the same wet ground that kills my Avocado trees.

We find that Avocado trees will grow well in thick banana clumps, with water not far from the surface, if the tree is not over four inches through the trunk. I have hedges of bearing orange trees in rows that are thirty feet apart and wherever I can get a space between the orange trees I plant an Avocado tree. I find that with my care the tree has no trouble getting above the tops of the orange trees, because the Avocado tree roots will mingle with orange roots, without one hurting the other, providing there is moisture enough for the Avocados.

To get the best results from the Avocado tree, it must have more water during our dry times than the orange tree requires. We plant Mexican Avocados at Emeralda, Lake County, on the Ocklawaha River three quarters of a mile from the south line of Marion County, and if it had not been for our continued high water we would have had a fine grove of trees, about thirty feet high.

About three years ago, I could have told you much about the merits of Mexican Avocados, but now I don't think that I know a great deal about them, but appear to have settled down to the Harman, Gottfried, and Puebla varieties, and am not now sure of the bearing qualities of the Gottfried and the Puebla. We know of no finer fruit than the Gottfried. The Fuerte is said to be a hybrid resulting from a cross between the Mexican and the Guatemalan types and its fruit is also rich and great, but in my location, near the river swamp, the fungus makes decayed spots on its fruit, and many fruits are spoiled.

The Fuerte fruit, or some variation of it, is the Avocado that Lake County and the other parts of Florida, in the same latitude, will eventually raise in great quantities.

I have planted a hundred Fuerte seedlings at Yalaha, Lake County, to see if I can get a good fruit with a good skin for our neighborhood. We also expect to plant some in hedge form along a fence.

On the southeast sides of the four large lakes, in Lake County, the Guatemalan types of Avocado can be raised, and as that is the commercial one, the people in those localities will soon wake up to its great possibilities, when budded on Guatemalan or Mexican roots.

The new growth on Mexican Avocado trees will stand a little more cold than the new growth on the orange tree that grows by its side.

When you have only a few Avocado trees that you want to start in the cool part of Florida, it is best to shade them on top, and on both the east and west sides, leaving the north and south sides open, so that the cold northwest winds can sweep through, and hit the tree, to prevent frost forming on the tree. Frost above freezing will hurt a tree more than freezing without frost, but when it gets a good deal below freezing and the Avocado tree has a heavy coat of frost on it, the leaves of even a Mexican get hurt some.

When an Avocado tree is shaded, the node lengths will be much longer, and that will make the tree higher. When it is grown in full sun the joints are shortened, so as to keep the leaves close

along the trunk, to prevent the sun burning the tree.

At Yalaha on the southeast side of Lake Harris, we have a small planting of a number of Guatemalan varieties, and some day it will be found which varieties will do the better on that piece of land.

It appears from what we hear, that one variety of Avocado will do well around Homestead and be a poor variety in another part of the state or on a different kind of soil.

The Nimlioh buds take so well on Mexican, and the trees do so well and make such symmetrical tops, like Popeno's photograph of the parent tree, that I can't give it up till I try it out on my own land.

Our record of our first Mexican fruit, in 1921, is:

San Sebastian—First fruit ripe June 20th; the last fruit taken from the tree July 30th; 27 good ones and 2 spotted.

Harman—First fruit ripe June 29th; last ripe Sept. 12th; 79 fine and 27 spotted.

Northrop—First fruit ripe July 4th; last Sept. 4th; 60 good, 110 spotted.

Gottfried—First fruit ripe Aug. 11th; last Sept. 18th; 32 good, 2 specked.

The Gottfried fruit weighed from 8 ounces to 15¾ ounces.

The above varieties of fruit, were on trees that we planted about two years before gathering the fruit.

The Mexican fruit cracks and gets rotten specks on them to some extent. By picking the fruit at the right stage, just before ripening, the splitting can be prevented.

Our experience leads us to hope that the experiment station at Eustis will raise seed from Fuerte and other Mexican-Guatemala Hybrid varieties, that are grown in with Mexican varieties, like Harman and Puebla, and do something with the seed to help find the Avocado for Lake County and its surrounding counties.

Tung Oil Seed as a Possible Horticultural Crop in Florida

Wilmon Newell, University of Florida Experiment Station

The Chinese wood-oil or tung-oil tree, *Aleurites fordi,* is one of the most interesting and perhaps valuable of the many thousands of plants introduced from foreign countries by the Office of Foreign Seed and Plant Introduction of the United States Department of Agriculture.

ECONOMIC VALUE

Probably the first thing to be considered in connection with any new horticultural product is the uses to which it may be placed; in other words, the economic value of its products. In this respect we find that the products of the tung-oil tree occupy a very important place in industry and that their consumption is very large.

In order to appreciate to the fullest extent the many uses for tung-oil and its related products, we naturally turn to the history of the tung-oil tree in China. In that country, the tree has been grown for many centuries and the oil extracted from the seeds has been employed since time immemorial. The uses of the oil, in general, are the same as those to which paints and water-proofing materials are placed in America. The Chinese junkman uses no paint on his boat or junk but instead coats it with the cruder grades of wood-oil. The residue remaining after the extraction of the oil from the nuts is burned to soot and is then mixed with wood-oil to form a paste for caulking boats. The oil is used as a natural varnish for houses, furniture and other woodwork, as well as a water-proofing material for cloth, shoes, clothing and paper, the latter being used for the making of Chinese umbrellas, baskets for the transportation of liquids, etc. In fact, it is said that by its use the Chinese have been able to get along in an admirable way without rubber. The residue after extracting the oil is used in China as a fertilizer and in the manufacture of lampblack, while the burned oil and husks are used in the making of Chinese ink, the latter familiar to all artists and draughtsmen as "India Ink."

In America and other progressive countries, tung-oil is used in the making of varnish, enamel paint, floor paint, flat wall paint, paint driers and water-proof varnish, as well as in the manufacture of oilcloth, linoleum and certain fire-proofing and water-proofing materials. The oil is used as a dressing for leather and in the manufacture of soap and the fatty acids from it are utilized in making lacquer or substitutes for shellac.

In China the bulk of the tung-oil trees grow wild. There are no commercial plantings such as we have of citrus fruits, peaches and other fruits in this country. On the contrary, the fruits are gathered by the Chinese farmers, the seeds taken out by hand and then roasted, ground and steamed by crude processes, after which the oil is pressed from the meal by means of crude presses made from hollowed-out logs. It is certain that the process of extracting the oil has remained the same for many hundreds of years.

The use of tung-oil in a number of our manufacturing industries has been a development of quite recent years. It was not until about 15 or 20 years ago that the manufacturers of paints and varnishes found that this oil would answer admirably the many purposes which had formerly been filled by the copal gums, the supply of which has been steadily diminishing for many years. As a result of this condition, the importations of tung-oil into the United States and a number of other countries have steadily increased until, at the present time, the dependable supply of the oil from China is no more than sufficient to meet the actual needs of the paint manufacturing and related industries.

The process of extracting the oil in China, as well as the conditions under which it is collected and handled before it reaches the export trade, are all antiquated, cumbersome and unbusiness-like; all of which tends not only to reduce the quality of the oil but, at the same time, to increase its price and to encourage adulteration. Most of the tung-oil is produced in Central and Western China, from which section of that country it is transported, for the most part, by means of junks on the Yangtze River to Hankow, which is the principal exporting point. In this journey the oil-laden junks must pass through the Yangtze gorges, where many of them are wrecked. On their trip they are also subject to attack by bandits and taxes are usually imposed upon the cargo by the officials of each province through which it passes. When the price of oil is high, the temptation to adulterate the oil is most too great to be resisted, even though agents of the exporting companies reject adulterated oil. Tea oil, sesame oil and even American peanut oil are used as adulterants.

The value of the oil to American manufacturing industries is realized when it is recalled that the importations to the United States alone amounted in 1922 to more than 79,000,000 pounds and for the calendar year 1923 probably more than 80,000,000 pounds, valued at approximately $11,000,000.

With the only supply of a material as important as this being constantly subject to so many vicissitudes, it is little wonder that the manufacturers of paints and varnishes should turn to Florida as a place where it may be possible to develop on American soil a dependable source of supply.

INTRODUCTION INTO UNITED STATES

To the Office of Foreign Seed and Plant Introduction of the United States Department of Agriculture sole credit must be given for the introduction of this tree into the United States. So far as we have been able to learn, the first importations of seed for planting purposes

were made in 1905. These seed were planted at the Plant Introduction Garden at Chico, California, and one year later trees were distributed from that point to various experimenters in the Southern States and in California. It is interesting to note that the first tung-oil trees planted in Florida came from this initial planting of seed at Chico in 1905, that one of these trees is the oldest bearing tung-oil tree in America, another is apparently the largest tung-oil tree in this country and, finally, that one of these trees produced, in Florida, the seed from which was made the first wood-oil to be produced in the United States.

The history of the tung-oil tree in Florida dates back to November 15, 1906, when five trees were planted at Tallahassee by the late W. H. Raynes, a well-known horticulturist of that locality. Mr. Raynes kept very careful notes upon the tree and these notes constitute a very interesting chapter in the horticultural history of the state. We have not time to give in detail the history of Mr. Raynes' experiments but suffice to say that only one of his trees survived and, after being subjected to various vicissitudes, produced its first fruit in 1908. In 1911 the tree produced 344 fruits and the most of these Mr. Raynes furnished to the Department at Washington, this being the first bushel of tung-oil "nuts," or seed, produced in America. In 1913 oil was made in an experimental way from seeds produced on Mr. Raynes' tree. As a result of his enthusiasm over the tung-oil tree, one of his neighbors, Dr. Tenant Ronalds, became interested and planted a four-acre grove near Tallahassee. This he afterwards enlarged to 40 acres. This became the first bearing grove of tung-oil trees in America.

WORK OF THE FLORIDA EXPERIMENT STATION

A number of tung-oil trees received from the Office of Foreign Seed and Plant Introduction were planted on the grounds of the Experiment Station at Gainesville in 1910 and 1912. These trees have grown in a very satisfactory manner and, at the present time, average 21 feet in height, with an average top-spread of 26 feet. Their trunks, at a distance of 12 inches from the ground, vary in diameter from 7 to 17 inches, the average being 8.4 inches. The yield of these trees has been rather variable, as the trees were planted only 10 feet apart, a distance now found to be entirely too close. The 10 trees yielded in 1922, 89 pounds of seed and, in 1923, 185 pounds of seed. During the period from 1912 to the present time, the trees have, on 25 occasions, been subjected to a temperature of 25 degrees or below and, on four occasions, they have been subjected to temperatures of 20 degrees or below.

A considerable number of experiments have been carried on at the Station in growing young trees and small groves have been planted for the purpose of carrying out fertilizer and other experiments.

DESCRIPTION OF TREE

In appearance the tung-oil tree is not unlike the common Japanese varnish tree, which is frequently used in Florida as an ornamental shade tree. The leaves are large, dark green and more or less heart-shaped, while others have three rather

distinct lobes. Both types of leaf occur on the same tree. In habit the tree shows a tendency to branch low unless pruning is practiced and the tree forms a straggling top or head rather than a straight, well-pronounced, central trunk. It is strictly deciduous, shedding its leaves in the fall and remaining dormant during the winter months.

In spring the blossoms make their appearance slightly in advance of the leaves, the blooming period at Gainesville varying from about March 1 to April 10, depending upon the season.

The flowers are borne in clusters, each blossom being white, tinged or striped with pink. Each cluster is usually made up of only one or two pistillate flowers, surrounded by numerous staminate flowers. Mr. Harold Mowry, Assistant Horticulturist, has found that there is an average of 62 male blossoms to each female blossom. A tree in full bloom is a very attractive sight.

The fruit is from 2 to 3 inches in diameter, dark olive-green, turning to a dark or deep brown as maturity is reached. Mature fruit is not unlike a small apple in shape. The fruits are usually separate but sometimes occur in clusters of two or three.

Each fruit consists of an outer portion or husk containing from 3 to 7 firm, brown seeds. Although these seeds are commonly referred to as nuts, they are not, botanically speaking, true nuts but it is likely that growers will refer to them under this name in spite of all efforts of the botanists.

The individual seed or nut in shape and color reminds one of an extremely large castor bean which, indeed, is a not distant relative. The interior of the seed is white and the meat decidedly oily. The seeds contain a poisonous substance and must not be eaten. When the fruits mature they fall from the tree and harvesting consists in simply gathering the fallen fruits when it is convenient for the owner to do so. The seed is removed by breaking open the partially decayed or fermented fruits.

The tung-oil tree belongs to the family *Euphorbiaceae*. Other familiar representatives of this family are the Euphorbias, Croton, Acalypha, Poinsettia and the castor bean.

While five species of *Aleurites* are described in literature, the one found to be most hardy and which furnishes the great bulk of the Chinese wood-oil is the one known as *Aleurites fordi*. The Bureau of Plant Industry has also introduced *Aleurites montana* and we now have at the Experiment Station young trees of this species. A bearing tree of *Aleurites moluccana* occurs on the property of Mr. D. H. Cramer at Lake Worth, Florida, and, so far as we are able to learn, this is the only bearing tree of this species in the United States. *Aleurites cordata* occurs in Japan and *Aleurites trisperma* in the Philippines.

PROPAGATION, TRANSPLANTING AND CULTIVATION

Practically the only method of propagation employed in China, and up to the present time in this country, is that of growing the trees from seed, although it has been determined that the trees are readily budded and grafted, using tung-oil tree seedlings as the stocks. The lat-

ter fact, of course, assures a method of propagating any strain or variety which may be found particularly desirable.

Young trees are readily grown by planting the seeds or nuts, preferably during February, about 8 to 12 inches apart in the row and with rows at least three feet apart to permit of easy cultivation. Experience at the Gainesville Station has shown that seedlings produced from summer-planted seed are not satisfactory, as they do not reach sufficient size and hardiness to escape damage by the early frosts of winter. The whole fruit should not be planted, owing to the fact that the three to seven seed within the fruit sprout and come up together, resulting in severe root competition and in spindling trees which do not have vigorous root systems. The same applies in the case of volunteer plants which come up under bearing trees.

We have found at Gainesville that trees from seed planted in February are from 10 to 18 inches high by the following winter and can be transplanted to the grove when one year old.

It was formerly thought that a distance of 20 feet apart in grove plantings would be sufficient but, judging by the large size attained by the bearing trees now in Florida, it is evident that, for permanent plantings, they must be at least 25 feet apart and it is not unlikely that 30 feet apart would be better. The tree is transplanted by the usual methods of digging with care and replacing in the grove location at the same depth at which the tree stood in the nursery. No root pruning is necessary, other than trimming off any injured roots. In the case of seedlings more than one year of age, it is necessary to cut back the top when transplanting. In the case of yearling seedlings, the tip may be cut off to insure a low-branching tree. The rate of growth, when good care is given, is very rapid and the first fruits usually appear upon trees when they are two to three years old from the seed; in fact, it is not unusual to see blossoms and fruit upon trees in the nursery row when the trees are in the second year of growth. Experience thus far indicates that yearling trees grown from winter-planted seed are likely to be most satisfactory for grove purposes.

ENEMIES

In some of the recent literature concerning the tung-oil tree, the Director of the Florida Experiment Station has been quoted as saying that the tung-oil tree is less subject to insects and diseases than any tree he knows of in the State of Florida. This quotation is not exactly correct, for we have not made any statement quite as strong as this. We have, however, stated that the tung-oil tree has apparently been established in America without having been accompanied by any of the insects or diseases which habitually affect it in its native home. If this be true, it lends considerable encouragement to the view that the culture of the tree in the South can be made commercially successful.

However, no plant—at least of any value to man—is known to be immune to insect pests and other enemies and when a plant is introduced into a new environment it is natural to suppose that some of the insects and parasites already there will gradually adapt themselves to

the new plant. This is what is apparently taking place in the case of the tung-oil tree in Florida. Up to the present time we have found it subject to attack by the nematode, by cottony cushion scale and by the Latania scale. The attacks by these enemies are, thus far, no more severe than are their attacks upon many other trees and plants which already occur in Florida, many of which are successfully and profitably grown. However, it is a certainty that insect enemies, and probably fungus or bacterial diseases, will have to be reckoned with in the production of the tung-oil tree, as is the case with all other horticultural crops.

ADAPTABILITY TO CENTRAL FLORIDA

The tree appears to suffer less damage from cold injury during the winters and to experience less frost injury to the blossoms in the vicinity of Gainesville than is the case in southern Georgia, southern Alabama and even the northern part of Florida. The experience of Mr. Raynes and others at Tallahassee shows that there are occasional winters when nursery trees are killed to the ground and even young trees very severely injured. There must also inevitably be seasons when the trees bloom out early in the spring and are subsequently caught by frost, resulting in a failure of the crop for the ensuing season. These types of injury have not been experienced at Gainesville but it must be admitted in this connection that the extent of the injury and the ability of the tree to withstand low temperatures will probably depend very much upon the condition of the tree and this, in turn, will depend upon the nature of the care given it by the owner.

In China the tung-oil tree is said to be grown mainly upon clay hillsides and in waste places. The tree has done well upon the clay soils in the vicinity of Tallahassee, Florida, but at Gainesville all of the plantings are upon Norfolk sandy loam, which is a very sandy soil naturally rather deficient in plant food. The tree has not been tested to any considerable extent in the southern half of the peninsula but it is not likely that it will find there a temperature too high for it.

EXTENT OF PRESENT PLANTINGS

It is estimated from all information available, that there are planted in Florida at the present time a total of 33,185 tung-oil trees, other than those in nurseries. Of this number 3,307 are in bearing, most of them being in Leon County. The number of non-bearing trees in grove formation is estimated at 29,878, of which 28,594 are in Alachua County. The remaining trees are distributed through 19 counties, from Escambia County to as far south as Palm Beach County.

PROBABLE RETURNS

The data thus far accumulated does not make it possible to predict, with any degree of accuracy, the financial return which may be anticipated from the commercial culture of the tung-oil tree. Sufficient data are not at hand upon which to presage safe estimates and any attempt to estimate probable acreage production on the basis of behavior of a few trees is, at best, a dangerous procedure. We have, however, reached the place in the study of the tung-oil tree where it looks as though its culture may be commercially

profitable and this point can be determined only by actually growing the tree upon a commercial scale over a period of years. The average production of trees under Florida grove conditions is still unknown and there are no data available as to the maximum crops which may be produced from single trees under good care or as to the life of the tree itself. The market price for tung-oil in future years will also have a most vital bearing on the question of profitable returns.

At the same time, you will doubtless wish to know that data, however meagre, are available upon this question. The only estimates that can be made must, of necessity, be based upon the behavior of what few bearing trees there are in Florida at the present time and perhaps the production of the ten trees (10 and 12 years old) on the Experiment Station grounds at Gainesville afford as safe a criterion as any for such speculations. The average production of these trees in 1922 was 9 pounds of shelled nuts per tree and, for 1923, 18½ pounds per tree. The average annual production for the two years was 13¾ pounds. On the basis of 70 trees to the acre, a production equal to this average would mean an acre yield of 962 pounds.

Any price for the seed based upon their demand for planting purposes must necessarily be temporary. The permanent value of the crop must be based upon its value for oil production. In this case the value of the crop will vary directly with the price of oil. According to a recent bulletin by the Deparment of Commerce, the market price of the oil, American basis, has not gone lower than 8 cents a pound during the past 10 years and has only once gone below 10 cents. Prior to the World War, the price was usually in the neighborhood of 12 cents and the highest price reached was in May, 1923, when it went to 45 cents.

For the purpose of making estimates, it may be well to use the approximate minimum price of the past 10 years, namely, 10 cents per pound.

The theoretical crop of 962 pounds of seed per acre from trees 12 years old would produce about 321 pounds of oil. On the basis of 10 cents a pound, this production would give a gross annual return of $32.10 per acre. From this must be deducted the cost of expressing the oil and its transportation to consuming centers. However, it is the opinion of those who have studied the subject that the latter charges will be offset by the fertilizer value of the pomace, so for practical purposes and until more data are available, the value of the oil may be considered as the probable return to the grower.

Of course, many factors may enter into any estimate of this character. For example, the average production of 13¾ pounds per tree, in the case of the Experiment Station trees, is a two-year average, one year of which showed a production which was probably far below normal. It is also true that these trees are growing too close together for them to attain maximum production. On the other hand they are far better protected from storms, winds, floods, fires and soil erosion than would be trees in the average grove planting. It is also true that some of these trees are very scanty producers and a grove of trees from selected stock would naturally give a much higher

yield. Trees well cultivated and fertilized would probably produce more heavily but this has not yet been demonstrated.

As can readily be seen, the market value of oil directly influences the acre return. Oil at 20 cents a pound, on our theoretical acre-production of 962 pounds of seed, would give a return of $64.20; a price of 30 cents would mean a return of $96.30, etc.

At first sight, a crop yielding a probable minimum acre return of $32.10 may not appear attractive. However, it must be remembered that the attempt has been made to make this estimate upon the most conservative basis; that the trees upon which this estimate is made have received neither fertilizer nor cultivation. It is also well to recall that the harvesting of tung-oil nuts does not call for skilled labor; packing houses for grading the product are not necessary and the product does not have to be wrapped in tissue paper and hand-packed in expensive fruit boxes. Neither is the crop perishable; the producer can await favorable changes in the market before disposing of it. There is no immediate danger of overproduction.

It is not our opinion that any fabulous fortunes will be made from the growing of tung-oil in Florida. On the contrary, it seems more likely that the production of tung-oil nuts will be found to yield the most satisfactory returns on the small or average farm where their production is made part of a well-ordered farm practice and management. The average farmer of Central Florida has lands lying idle at the present time which appear to be suitable for the growing of tung-oil trees. He can plant and care for a few acres of these trees without perceptibly adding to the annual cash outlay for operating his farm and much of the work involved, including that of harvesting and shelling the seed, can be done by himself and members of his family without interfering with the production of other crops, raising of livestock, etc. A farmer under such conditions can naturally produce tung-oil seed at a lower cost than can the commercial grove owner. It is also interesting to note, in this connection, that our minimum estimated acre return of $32.10 is higher than was the average return obtained in 1922 by the Florida farmer for cotton, corn, peanuts, field peas or hay. If he can afford to grow the latter crops for returns which vary from $8.00 to $30.00 an acre, he can probably produce tung-oil seed for at least as low a figure, especially when it is remembered that he would not have to prepare his land and plant a new crop each year.

The conclusion should not be drawn, however, that the tree is one which can be planted and neglected. On the contrary, very good care, cultivation and attention are necessary to get an orchard well established.

We are not at this time inclined to believe that the culture of tung-oil trees will be found attractive in the highly developed citrus and sub-tropical fruit sections of Florida, for the reason that land values in these sections are most too high to justify their being devoted to a crop likely to yield large gross returns.

On the whole, the prospects for adding to Florida another horticultural product of value by utilizing the tung-oil tree appear to be very good and it is to be hoped that those who engage in the planting of

tung-oil trees will consider carefully the plain facts and not permit themselves to be carried away by the enthusiastic representations of promoters who may seek in this situation the oppo tunity to make profits for themselvees.

Should an industry of value develop in Florida in the production of tung-oil seed, the credit therefor must be given to that wonderful organization of plant explorers of the United States Department of Agriculture who, under the leadership of Dr. David Fairchild, have already added so many millions of dollars in wealth to the horticultural industries of this country.

Evergreen Ornamental Trees for Florida

Mrs. Marian A. McAdow, Punta Gorda, Florida

The planting of ornamentals in Florida has received a tremendous impetus in the past two years and from this time on through the years to come there will be no cessation as people with means are coming in such great numbers who are buying property that in many cases is quite undeveloped and unplanted and, to these the advice in this article is specially directed. Newcomers provide themselves with nursery catalogs and with this meager means of advice they select at random such trees and shrubs as attract them by the more or less glowing description that can be crowded into three or four lines by the nurseryman. The most essential knowledge that is necessary for good planting cannot be crowded into the few pages of a nursery catalog, so, the novice uses such reason as his experience with the gardens of the North may have taught him and often the result is a fearful jumble that only gets worse as the trees and shrubs increase in size. One reads about the gorgeous display made by the royal poinciana in June and he decides on having one or more, with no more basis for the planting other than that it is gorgeous in June. Often the owner of the tree is not there in June or any of the summer months, and, not knowing that the tree is almost entirely leafless during the months he is in Florida, he gradually comes to the realization that it is anything but an ornament to his garden during the winter months when he most desires a green and summer-like environment about his home.

I shall draw upon my experience in my own garden, for the most part, in describing the trees and shrubs recommended. Actual experience means a great deal when advice is given. Plants have a way of acting quite different when they are moved into a new environment. Often they take on mammoth proportions under different skies and soil conditions. Again they may become dwarfed and stunted in appearance. A knowledge of the facts bearing on the ways of plant behavior in Florida is invaluable in planting for successful effects. Time, energy, money and one's hopes may be conserved by knowing what to plant and how. Let it be understood that we shall consider the trees and shrubs in this article that may be expected to bear good appearing foliage through the winter months, leaving out even those that are bare only a month. Among these you will not find flowering specimens because most trees of the tropics bear their flowers either at a regular spring or sometimes, fall season. For artistic effects, trees of great extremes in foliage may present as interesting and beautiful a picture as they would if they bore flowers.

There are at least fifty varieties of

the palm family that keep their form and color through the winter months. These being hot-house specimens in the northern states, make a greater appeal to visitors than other forms of trees. There are two distinctly different types of palm, one being the fan-leaved and the other with leaves not unlike enormous plumes. Some of these grow so fast that they may be made to take on mature proportions in four to eight years time. I have a Caryota urens or fish-tail or toddy palm that was twenty feet tall at four years of age. These are exceedingly handsome things, their heavy chopped-off green wedges giving the tree the appearance of gigantic celery. Any of the caryotas are desirable that may be found in our state nurseries. They are not always easy to obtain as the supply has always been limited.

Among the other plume-leaved types of palm are the Acrocomias and Cocos varieties. The former has a very handsome top of silvery green leaves and a trunk thickly studded with long slender needles. These may be shaved off with a keen hatchet up to a height that makes the tree safe. The tallest specimen in my garden made a trunk twenty-five feet tall inside of five years. It was planted in a mucky spot that had a high water-table each day when the tide was high.

Cocos romanzoffiana bears the best looking crown of the many pinnate-leaved palms. The specimen in my garden is 35 feet tall to where the leaves appear and these are twelve to fifteen feet long. The palm made this growth in twenty years, for it has not changed much in appearance in the last three years.

Along water courses or near the coast a quick growing and elegant palm is raphia ruffia with its stems of rich orange and crimson that give it an unusual distinction. It sends up breathing tubes for a space of five or six feet from its base, a provision Nature made whereby it could get more oxygen to carry on combustion when its roots might be flooded. This palm is not common and only occasionally may one find it tucked away among the hundreds of commoner ones that are found in most commercial nurseries.

Where the temperature does not go too low the coconut palm may be used to great advantage. For the world and your neighbor it appears best rising behind the house, overtopping low-growing trees and shrubs and standing out in strong contrast against the masses of green of less definitely marked trees. If the grounds are large enough to permit, a clump planted at a point of vantage where their fronds will stand out in strong relief against the night-sky, will give a character to your garden which no other trees can produce with their flat dark masses of foliage. No two coconut palms are ever the same. They bulge or lean or make leaves that are different in one way or the other from their fellows and these variations give a personality to this palm that endears it to man as does no other. Bignonia radicans climbs up some of mine and when this vine is in bloom it adds a touch of vivid color that is very taking.

All the Areca palms make exquisite clumps and with the passing of time may form slender bamboo-like trunks thirty to fifty feet tall. They look best if allowed to sucker from the roots.

Another class of pinnate-leaved palms that make exceedingly handsome clumps

as well as single specimens are the Phoenix varieties. There is a great degree of variation in this species and one may choose them from a dark green to the lightest of silvery green by selecting certain members of the family. They do not grow as fast as some of the other palms already mentioned but they are beautiful from the time they are two or three years in the ground.

Where the royal palm, Oreodoxa regia, can be grown, this makes large specimens in a few years. The largest ones in the grounds of the Royal Palm Hotel in Fort Myers are but sixteen years in the ground. This palm is far more graceful and interesting planted in groups instead of straight lines but man must arrange his plants like so many soldiers prepared for war or he is not satisfied.

The fastest growing fan palms are the three members of the Neowashingtonias. A "robusta" of that family that was given me by the Plant Bureau in Washington twelve years ago is forty-five feet to its leaves and anything but an addition to the spot it occupies, although, had I known it was to make such an amazing growth in such a short time it would have been delegated to a place in the background where it would have attained a note of beauty by comparison with other trees in close proximity.

All the Latanias and Livistonas have done well for me and some of the silvery leaved members with red edges and leaf stems strongly marked with clear crimson are exceedingly handsome. The Thrinax palms have fan-shaped leaves and grow more slowly than the others but ultimately they have trunks thirty feet tall. Of the palms that enjoy a peculiar and distinctive elegance, the Cycas circinalis and media are so beautiful that they should not be crowded back of anything. They grow to immense proportions in a few years. The trunks form very slowly but twelve-foot leaves are not uncommon on several specimens I know. These are difficult to get and command a big price when they may be obtained.

A low growing palm that makes a handsome filler is the Rhapis. Its trunks are always very slender and its deeply cleft finger-like leaves standing out at a right angle to the trunk are a rich shade of green and clump-like thickets are formed in a few years. This does not cover the number of palms one may use to advantage in planting a garden. Any plant catalog that lists palms contains more than I have mentioned and very rarely are any listed that are not desirable.

All the Agaves, aloes, furcraeas, and yuccas preserve a healthy green appearance during the winter months and are as characteristic in their way as the varied differences in palms.

Directing our attention now to the true trees, almost all members of the Ficus or rubber trees retain their leaves, putting on new ones so fast that the trees never appear denuded. Rubber trees have some faults that should be considered before they are planted as life companions. The large leaved varieties are very trashy and, as some shed their leaves almost continuously, one needs to rake up after them daily. As one interesting writer tells us, the natives of India say that they shrug their shoulders every night at the hour of twelve so that the weary native may have no rest in the daylight hours.

If you do not mind this daily attention with the rake, any of the large-leaved rubber trees make immense specimens in fifteen to twenty years. My own Ficus altissima at nineteen years has a trunk thirty feet around and the limbs are fifty feet long. If your grounds are small you will be compelled to move the house. This will be easier than cutting down the rubber tree.

There are certain small leaved rubbers like "benjamina" and "nitida" that are as handsome in their way as the ones with large leaves and although these shed their leaves too they do not make so objectionable litter. They are gross feeders and I can find their roots one hundred and fifty feet away from the trunk. Dr. Nehrling of Naples, Florida, is making a collection of the best members of the ficus family and already he has over forty varieties. Although some are but three years old they are thick clumps twelve to fifteen feet tall and from this age they take on proportion most rapidly. Almost all of them bear figs of varying sizes that birds are very fond of and the palm trees mentioned, with the exception of the coconut bear seeds with a fruity exterior that the birds either eat whole or else pick the outside covering from.

The handsomest evergreen tree in my garden, in my own opinion, is a Harpephyllum that came from the Bureau of Plant Industry. Its more common name is kaffir plum but it has borne no plums for me. This tree is now 35 feet tall and has a trunk twelve inches through at the ground. Its beautiful glossy pinnate leaves grow in a whorl around the stems of the branches. I have never seen it shed its leaves yet excepting on one occasion when we had an inundation from the bay of strong salt water. In other soil I should expect it to fruit but in the sea-sand of my garden it probably finds uncongenial conditions for fruiting, although its foliage tends to convey the idea that it is doing its very best right where it stands.

Another tree that is very distinctive in its leaf growth is a Toddalia lanceolata, or perhaps "undulata," as its small leaves in palmate formation on the leaf stems are most decidedly undulated. The foliage is very dense and the branches are for the most part quite flexible and elastic, twisting and turning its handsome garment of green like some coquettish charmer on a mimic stage. A peculiar odor emanates from the leaves and often I am accused of entertaining skunks, which I indignantly deny and, when the offender turns out to be a tree, my taste is held up to criticism which I defend by calling attention to the foul smelling ambergris of the whale which is the base of all enduring commercial perfumes. The odor of the Toddalia tree is the base, so to speak, of the aroma of my garden. I've ridden on an Atlantic Coast Line train in the summer in Florida when the aroma of the humans enclosed in a car made the skunk odors that we passed through occasionally, seem like the perfumes of the tuberose. The flower and seed of the Toddalia is very inconspicuous.

Schotia is another tree that holds its leaves and flowers, too, during the winter months. It has not grown very rapidly for me, being now about twenty feet tall at fifteen years of age. It blooms most profusely in the early part of April and has

a few scattered bunches of bloom at other times of the year. These flowers are a dark red, growing in close large bunches that are attached to the main branches with hardly any stems. They have no perfume that is strong enough to be detected at any distance from the tree but a nectar which forms in the flowers drops so profusely that the ground is often damp with it. This tree sheds its leaves in the spring but puts on its new garment so quickly that the transition is hardly noticed.

A charming Citharexylum or fiddlewood holds its leaves as persistently as the Toddalia in my upper garden. It is very handsome, the leaves being a rather unusual shade of yellow-green, strongly marked with orange and red at various times of the year. Two varieties grow in my locality, one of these having quadrangular stems and being so brittle that they are easily snapped off in high winds but they put on new growth so quickly that such accidents mean only a trifle. There is a time of the year when these trees are covered with six to eight inch racemes of tiny white flowers that have more or less fragrance and when a tree bears a profusion of fruit this, too, has an ornamental character that is pleasing, the color being a light brown shot with a translucent orange and red.

The most rapid growing of all the evergreen trees is the Australian pine. These are Casuarinas and there are several varieties of these raised in Florida. They have a somber funereal aspect that does not invite enthusiasm but when grown along the line of a back fence they have a useful purpose in forming a quickly available background for the more ornamental trees already mentioned. With age their wood usually grows brittle and they break easily, and, unlike the Citharexylum are not so easily trimmed back to good form. The Australian oak, a Grevillea, is more or less common in Florida but seldom takes on pleasing proportions. In California these trees are brought back to symmetry after they have grown shaggy looking, by cutting them off fifteen or twenty feet from the ground. A very beautiful new growth then puts out but here in Florida I found that the wind whipped and broke off the new growth so as to quite ruin the effect desired.

A tree from Australia, as are the two last described, is the Melaleuca leucadendron which is commonly known in its native habitat as the cajuput tree, is an exceedingly quick grower which sheds its leaves so gradually that the tree is never bare. Its habit of not making a spreading top lends itself to some special forms of planting wherein this tendency is used to good advantage. It has a white flower that is borne profusely at one time of the year, but is of such character that it never makes a striking display with its bloom.

Podocarpus chinensis or Chinese yew-tree is a most beautiful species of the evergreens and Sciadopitys or umbrella pine of Japan. It makes handsome specimens in Florida that keeps its foliage right to the ground.

Araucaria bidwilli or bunyabunya pine of Australia is a glossy evergreen tree with peculiar and very beautiful foliage that grows well for us and makes tall trees in ten years time and some specimens I have seen keep their branches well

clothed right down to the ground. My own lovely tree, growing within ten feet of the salt waters of the bay, still grows its foliage low down even though it has been blown down twice because of its heavy top, and twice it has passed through salt-water inundations which did not seem to do it any great harm. When the new light green growth comes out on this tree it is exceedingly beautiful. It is said to bear enormous cones but so far, I have never seen these on any Florida specimen.

Among the lower growing trees and bushes that make a dense growth of leaves and retain them during the cold months, the Schinus terebrinthifolius or Brazilian pepper tree is one of the most rapid growing and handsome. Its leaves are larger than those of the roses we are most familiar with, formed in somewhat the same shape and the color is a rich dark green. During the winter months the bushes are loaded with small bright red berries formed in massed bunches, and they have a decidedly peppery flavor that appeals to birds. This bush can be trimmed to any form that fits into a landscape scheme and does it so quickly that it should be in great demand in the newly developed subdivisions that one finds at the outskirts of all growing cities in the State. This small tree seems to form more and redder berries on poor unfertilized soil. I have a bush twelve feet tall and twenty feet broad that would be thirty if I did not constantly keep it pruned, that is very symmetrical in its contour and is four years old.

My garden possesses another bush ten or twelve feet tall and as many across, with a glossy dark green impari-pinnate leaves and small insignificant racemes of tiny yellow flowers, which came to me from Dr. Francheschi's nursery in Santa Barbara about ten years back, bearing the name Aglaia odorata, but no odor is apparent in the blooms and it is probably another variety. Chalcas paniculata or orange jessamine from India is so like it in leaf that even an experienced grower of the latter is deceived by the Aglaia. The Chalcas has a small white flower with a delicious perfume and the red seeds that follow the flowers are very beautiful and, as this low growing tree or bush is found all over Florida, as it is a great favorite and easy to grow from seeds, it can be recommended as a splendid subject as a filler in backgrounds.

The lovely Ixora makes a handsome large shrub that blossoms almost constantly and may be obtained in various colors. These flowers are fine for cutting as they keep their freshness for many days in the winter months after being put in water.

For still lower growing subjects for fillers closer to the ground there are three forms of Sansevieria that grow with no attention whatever, after they are once placed in the ground. With them may be planted two forms of the Aspidistra and our own native Zamia or coontie. Plant these close enough and you can get any sort of solid effect you wish for.

If one is far enough south in the State Crotons may be expected to keep their leaves through the cool months and add a glowing note of color to the flowerless shrubs and trees mentioned. Some varieties of Hibiscus, especially a single crimson one retains its foliage and flowers profusely in the winter and a few

others hold their leaves and flower more or less. Oleanders may be added to the above list although they are not very generally used for their leaf effects but as they hold their leaves unless severe frosts visit them, they may be used when other more desirable trees are not available.

Two striking forms of plants that look well during our worst period of plant growth is the Ravenala or Traveller's tree and Strelitzia augusta, which resembles it somewhat. Their large banana-like leaves are not as susceptible to cold as is the banana, whose striking leaves make a distinct note in a tropic landscape.

This list does not cover all the plants that may answer the purpose of presenting handsome evergreen foliage the year around but these I have grown and know how they act under varying soil conditions and low temperatures and that may be planted with expectations of attaining the wished-for result of presenting luxuriant growing appearance at a time of the year when many plants rest or become dormant, either shedding their leaves or becoming rusty and ragged in appearance. Some of them may not be found in catalogues but a demand for them will force nurserymen to keep them and any of them may be obtained by commercial growers if they elect to raise them for the trade.

The Growing of Roses on the Home Grounds

Mrs. A. Mendenhall, Tampa

In writing this paper, I wish to say first, that I am not going to deal in scientific terms; that I am not a professional rose grower, and that what advice and help I may give will be based on actual observation and actual experience of my own, or of someone in whom I have the utmost confidence.

We have scarcely made a start in rose culture in the State of Florida. I see no reason why our roadsides should not be lined with beautiful rose hedges and I believe one day Florida will be noted for its rose gardens as well as is California. We are just beginning to see our possibilities in many ways, and the growing of roses is one of them. We have been listening too long to the fellow who tells us: "It can't be done in Florida."

I remember thirty years ago when we came to Florida, we rarely saw a rose bush, the Marechal Neil was the only one of any worth. Twenty-five years ago I purchased a few rose bushes. Today three of those bushes are alive—the others lived for years. They had no special care, were on high sandy land. I have grown roses for years. Only the strong growing varieties should be attempted by the average home rose grower.

Much depends on space, location and the time one has to put in the care of the plants.

I wish first to speak of location for your rose garden. I wish to say I hope that if you have no more than two dozen plants you will speak of it as your rose garden—"A Rose Garden in every country home" is my slogan.

Select the best low land you have for your Rose Garden—many homes in Florida of any size have at least a small rich low corner somewhere that could be converted into a beauty spot by putting out roses.

If it is away from the house you will feel better by spending a part of the day among your roses. If you have room in your yard have a few choice plants and a trellis for the climbers. We have several splendid varieties of climbers now, thanks to our own rose growers who have labored for years experimenting with those most adapted to our soil and climate. If you have rather large grounds have beds of roses among your shrubbery. Put climbers along the roadside. Let them climb along the fences. They are quite an improvement over the weeds we usually see. I am sure the good man of the house will see they are cared for as he tends his crops.

Just outside Tampa there is a Cherokee rose hedge, which at this time is a beautiful sight. The busy owner wanted other varieties, so she just buds into that

rose hedge any variety she so desires and she gets an abundance of roses constantly.

High sandy land will need to have a sub-soil of clay where the land is very thirsty and light but a good many varieties will grow without this preparation. To prepare the soil with clay—dig out eighteen inches of soil and put in a layer of clay. On this replace soil.

On low land this is unnecessary and you can grow your roses on their own roots as well as grafted stock. I have some cuttings in low muck land that in two and a half years have attained to twenty feet or more. Drain your low land by digging trenches. You will not be bothered with drought and will need very little fertilizer and will have an abundance of flowers. Where the myrtle grows roses will grow without clay.

And now as to fertilizer, as I have just said, use sparingly on low ground, but put one good handful of raw bone meal in the opening before placing plant in position. Do not use other fertilizer at time of planting. A mulching of dairy fertilizer and leaves will be sufficient.

I wish to emphasize the importance of mulching. The Florida sun is hot and the roots need protection. Also it serves to keep down weeds. Some object to using the mulching on account of the unsightly appearance.

I would recommend that you make a frame about four feet in diameter around plant and fill with mulching, then plant some border plant which will harmonize with your roses, if a single plant. If in a bed or garden you need not worry. Plants with plenty of blossoms are far more beautiful thus mulched than plants without blossoms.

I am writing for the benefit of busy home makers, and if you will have your laundry washwater thrown on the mulching once in awhile it will be very beneficial.

I know of some plants on high sandy land thus treated and they have done wonderfully well without clay. Don't try to grow roses under shade trees—they like some sun.

Now comes the most interesting part of my subject, and that is what variety to plant. Everybody loves roses, but few people think they can grow them. To such I would like to suggest that you try some of the following varieties.

In the white, strong growing Teas—White Hermosa, (Marie Lambert or Snowflake), Helen Good, Mrs. D. Cross, Clothilde Soupert, Frau Karl Druschki (White American Beauty.)

In pink—Jonkheer J. L. Mock, Killarney, LaFrance, Pink Cochet (Maman Cochet), Radiance, Paul Neyron, President Taft, Bridesmaid, Champion of the World.

Red—Black Prince, Louis Philippe, Minnie Francis, Helen Gould (Baldwin), La France (Duchess of Albany), Francis Scott Key, Red Radiance.

Yellow and flesh tints—Mlle Franziska, Kruger, Alex Hill Gray, Blumenschmidt, Marechal Neil, Safrano and the new rose, Betty.

Good climbers are: White—Devoniensis; pink—Cl. Mme. Caroline Testout; red—Helen Gould; yellow—Marechal Neil.

Planting should be done from December to April, preferably December and January. However, with care and mulching they can be put out as late as

April. Have good strong plants. Put four feet apart.

I would always advise buying strong two-year stock. It is much more satisfactory and will pay in the end. I have spoken of preparation of soil, and if the mulching is kept up little working of soil is necessary.

Trim plants in October—but strong growing trees and climbers need very little trimming.

For thrips, spray with Black Leaf-40 as directed on package for roses. For mildew use sulphur dust.

I trust this article will convince home makers that the home is not complete without roses. Yours for *more* "Rose Gardens."

Growing Gladiolus and Other Bulbs

T. K. Godbey, Waldo, Fla.

I began bulb growing, in an experimental way, twenty-five years ago, and after fifteen years of experimental work the results were so good I began to abandon a very profitable plant growing business, and turned my attention to growing bulbs and cut flowers for market. I began ten years ago on a very small scale, with less than four thousand bulbs all told, comprising one thousand Gladiolus bulbs, one thousand each of Chinese, and Paper White Narcissus, five hundred Calla Lilies, and two hundred Lilium Harrisii, all of which I had found in my experimental work to be dependable.

With a few other sorts to try out, all occupying about one fourth of an acre, for like most new beginners I gave them plenty of room. This small beginning has increased until my present plantings cover thirty acres with 50,000 to 100,000 bulbs planted to the acre and I believe I am regarded as the most successful grower of winter blooming Gladioli, Chinese and Paper White Narcissi in the United States.

Now as the subject assigned me by our worthy President, is growing Gladiolus and other bulbs, I will devote the most of my paper to Gladiolus, and only touch lightly on other bulbs.

As already stated I began growing Gladiolus, ten years ago with a stock of one thousand bulbs, and as no bulbs were grown in Florida, at that time, I procured my supply from the North. These bulbs were planted in early spring, and in due time produced a nice crop of flowers.

Now being new in the business and not acquainted with any of the retail dealers, except Mills the Florist, nearly all my flowers were consigned to wholesale florists, in our big northern cities, and the returns for my first crop were about seven dollars per hundred which was very satisfactory to me.

As I was green in the business I cut my Gladioli spikes when two or three flowers were wide open. I dug my little crop of bulbs when fully matured, and stored them away to plant the next year, and being pleased with my first crop, when planting drew near again I ordered ten thousand more bulbs from the north.

I now had one thousand Florida grown bulbs to plant alongside of my ten thousand from the north, and this gave me some new experience. When blooming time came I observed the Florida grown bulbs produced much stronger and longer spikes than those from the north, the blossoms were much larger, with more substance and better color, and when I shipped them the returns for flowers from the Florida grown bulbs was ten

to twelve dollars per hundred and six to eight dollars for the cut from the northern bulbs. I had also begun to cut my spikes when one flower was open.

I now began to get acquainted with more retail florists or more properly speaking they began to get acquainted with me and my trade began to rapidly shift from the wholesale to the retail trade, and I am proud to say I have never lost a customer.

Now as time moved on I gained more experience. In digging bulbs some are sure to be left in the ground and some of these bulbs would come up in the fall, and bloomed in the early winter, and this caused me to think on new lines. I reasoned that if I could grow Gladioli in the winter and put them on the market when flowers were scarce I would make a great hit, but just how to do this was the question. I had found that some of the Florida grown bulbs would come up in the fall and each year the quantity increased, but my stock was very small and I wanted more business. So after pondering the matter over a bright idea struck me.

I would get a dealer in the north to hold a supply of bulbs in cold storage from spring until fall and ship to me in September, first, believing they would start at once and give me a crop of bloom in November, so I wrote to Henry F. Michell, of Philadelphia, and told him about my plan. He promptly answered me saying he could furnish the bulbs, and had the cold storage, and gave me a very reasonable price for the work, but advised me not to go in very deep, saying he had tried this plan quite thoroughly and it had proven a total failure with him. Then I began to think I was not as smart as I thought I was, and I believe a great many other men have come to this same conclusion about themselves.

I took Michell's advice, and only ordered two thousand bulbs which arrived about September first and when opened up looked fine. They were planted at once in well prepared soil and in about ten days they were poking their noses out of the ground and looked good. They made a fine growth and I felt sure I would be able to send Mr. Michell a nice box of flowers in November, and show him how smart I was, but November came and went and not a bloom did I get. The stalks ripened and died down without showing a bloom, and I left the bulbs in the ground. They came up again in March and gave me a good crop of bloom in May so I did not lose on my investment.

My stock of Florida grown bulbs continued to increase, and all those that had bloomed in the fall kept up the habit, and new ones were breaking in so that my supply of winter blooming bulbs was slowly but surely increasing. I then began to look my stock of bulbs over about September first and I found a few bulbs that were beginning to sprout in the hampers, I decided that if I would select these out and plant them they would come up right away and bloom in due time. But if I planted the entire lot without selection, some would come up in ten days, some in a month, and some all along for about five months.

Now this is not so bad in Florida, where we plant out of doors, and have plenty of land, but this uneven germination does not suit the greenhouse man

in the north and as my crop of bulbs was increasing I now began to look forward to the time when I could offer the greenhouse man a stock of bulbs that would give him a full crop of bloom during the winter whenever he wanted them; and this must be done with bulbs that would start even and not go blind as the cold storage bulbs had done. Now to insure even starting I began to experiment further.

I had a good stock of early ripened Florida grown bulbs put in cold storage about thirty to forty days before I wanted to plant. These all came up evenly in a short while after planting, but only about ten per cent bloomed, the rest went blind. While this was very unsatisfactory, I decided as I had gotten a few bloom to try again, so the next year I put in another lot. Now this second lot gave me about ninety per cent bloom and made an even start and I began to think I was very smart and had solved the problem so the following year I put about two hundred thousand in cold storage in the same way I had done the year before. Now this brings me up to last fall. I planted all of these bulbs and expected to clean up as I had been getting thirty dollars per hundred for the last few years for winter Gladioli, but only one per cent of the lot produced bloom; all the rest were blind.

Well I sure cleaned up, but it was on the wrong side of the ledger, and I can say now I will not try any more in cold storage. I find that Gladioli bulbs will start naturally after six months rest and grow a good crop of bloom. I now have a good supply of bulbs that bloomed in early winter and were dug in February, some of which I have on exhibition, and these have never failed me.

Now as to the outlook for growing Gladioli bulbs commercially in Florida. The Gladioli is a native of a warm, moist climate, and finds a congenial home in Florida. It should be planted on land that is well drained and not subject to overflow. I plant in two-foot rows, and cultivate with an eighteen-inch sweep which I find is just right to clean out a row, and keep the land ridged up so as to give drainage.

I store my bulbs in bean hampers, and stack them up under the shade of trees and cover so as to keep out the rain. They cure and keep perfectly this way. The expensive way of curing on trays and storing in cellars as is done in the north is useless here.

Bulblets can be planted any time from January to August, and left in the ground until they reach blooming size before they are dug, thus saving the expense of digging every fall to prevent freezing as is done in the north.

Bulblets should be planted very thickly, a quart to twenty-five feet of row is about right. Some will come up in a short while and some will lay in the ground three years before they come up.

As to the quality of Florida grown bulbs I find they produce bloom fully fifty per cent superior to Northern grown, California, or European stock. I have fully tested them with all of these, side by side, and Florida was the winner every time. The outlook is now Florida will soon be the leader in growing Gladioli both in cut flowers and bulbs. Extensive plantings have been made in various parts of the State, in the past twelve

months, and many more are coming; some of the largest growers in the north have sold out and are coming to Florida.

Now as to the other bulbs. I began ten years ago with one thousand Chinese and one thousand Paper White Narcissus, and they have increased until I now have about five hundred thousand of each. I have sold two carloads of the Chinese, in the past two years but only about five thousand Paper Whites, and I still have more Chinese than Paper Whites, as the Chinese increase twice as fast as Paper Whites.

I also have Grand Soleil D'or and Grand Monarque Narcissi. I also grow Lycojum Vernum, Spanish and Dutch Iris, Hyacinths, Lilium Harrisii, Amaryllis, Tuberoses, Freesias, and cannas; all of which can be grown successfully in the State of Florida. I have also tried out a lot of bulbs that were a failure. Among which I mention Tulips, Lily of the Valley, Lilium candidum, Aurantum, Speciosum, Alba and Rubra, Peonies, etc.

Now as to the outlook for the production of the other bulbs in Florida. While I have 1,000,000 Gladioli growing, my principal crop is Chinese and Paper White Narcissi. My place has been visited by about a dozen of the leading bulb growers of Europe in the past twelve months, and after looking my stock over, they pronounced it the best they had seen. And some of them have tried out my bulbs in the greenhouses in New York, along with their own, and they report them as good as the imported, and every one that has visited me say they are coming to Florida to grow bulbs as soon as the embargo goes on. One has already located in Florida, and is expecting to turn out 5,000,000 Paper White Narcissi by 1926, besides a great quantity of other stock.

I have never had any diseases or insects to injure my Narcissi and I do not know of any being found in this State. It is very evident that Florida is the best place in the United States for growing Polyanthus Narcissi but the daffodils will do better further north.

Lilium Harrisii does well in all of the Gulf States, and small plantings have been made in Florida, Louisiana and Texas. My experience is they should be grown under a slat shade as they are sometimes injured by frost in the open ground.

Calla Lilies are easily grown. They do best on low, moist sandy land that is rich in organic nitrogen. The bulbs often rot badly and I have not found a remedy.

Freesias make a wonderful growth in this State; I have had bulbs that measured one and a quarter inches in diameter but they are not safe in the open ground where the temperature falls below twenty-six degrees.

This is my third year with hyacinths and so far they are very promising. They grow well, bloom well, and so far are free from diseases and insects.

Gladioli Suitable for Home Planting

W. H. Knull, Tampa

Following after a fine old gentleman like Mr. Godby that was in the business before I was born, makes me feel lame in talking to you about Gladioli. We do not have any thirty acres, and I want to talk to you mainly for home planting, which I am particularly intersted in, the beautification of the home grounds.

The soil conditions in Tampa and Florida generally seem to be nearly ideal for the Gladioli, and they require a good sandy loam. It is advisable to add some good well rotted manure to our average soil before planting. One should be very careful however, not to use fresh manure at any time for Gladioli.

Through several years experience in the growing of Gladioli in Tampa, I have found these varieties to be the most satisfactory for general use, America, Halley, Mrs. Frank Pendleton, Wilbrink, and Panama, in pink; Mrs. Francis King and Mrs. Watt in red; Chicago, white; and Peace white; Niagara and Schwaben in yellow. Any of these varieties are sure to give satisfactory results in this section of the state.

I have always found America very satisfactory here and a great favorite with the public, it is one of the oldest sorts but one of the best. The growers in the Miami section, however, do not find America at all satisfactory and grow very few of this variety. The stems there are short and grow only a few flowers to the stalk. Where I saw them growing, however, was on a heavy clay soil and I believe this had a lot to do with their trouble as they do not like the heavy soils, neither do Gladioli like the damp muck soils.

The bulbs should be planted about two inches deep, and may be planted (if the bulbs can be obtained) nine months out of the year in Florida. We have found that the rains during July, August and September do serious harm to both flower and bulbs but one may start planting the first of October and continue on right up until the middle part of June with good results.

If one wishes a continuous period of bloom, it is advisable to make plantings about two weeks apart all through the season, in this manner one is assured of flowers all through the period. Weather conditions will of course change things for us and sometimes it will turn cold and retard one's planting and then rush the next one, turning warm again so that two plantings will come in together, this is something however, that we can not control so we have to make the best of it.

Gladioli should never be planted on

the north side of the house or any other building, nor under trees or other shade as they want full sun. As an experiment one year we planted fifteen hundred bulbs under a well shaded slat house and we did not get a single bloom from them.

This bulb does not require much room and can be planted about the home in the various beds among the flowers and plants without any injury either to the Gladioli or the other plants, in this way it can be used to wonderful advantage to brighten up our gardens and home grounds through most all the year.

There are many new varieties of Gladioli placed on the market every year, some are good and others are not, so if one wishes to be sure of obtaining satisfactory results I would recommend that we stay with the old varieties that have been tried and proved satisfactory under our climatic and soil conditions.

Gladioli like plenty of cultivation and when planted in solid beds they should be cultivated regularly and all weeds kept from among them. It is advisable to work in some blood and bone tankage every once in a while when cultivating right on up until they are ready to bloom. It is advisable not to water the bulbs much until after they are well through the ground, unless the soil should be extra ordinarily dry. After they are well up they will stand plenty of water and should have it until they begin to flower.

In cutting the flowers it is well not to cut too low as this is likely to spoil the bulb after cutting, the stock should be allowed to die down naturally and the bulb should not be dug until the top shall have turned yellow. The water should be kept off them as much as possible after they have finished blooming.

I strongly recommend the Gladioli to the home owner as being one of the most satisfactory subjects to plant for cut flowers in Florida and one that no home should be without.

The Gladiolus

Wm. Edwin Clark, Sunnymede Gardens, Sharon, Mass.

It has become a fixed custom to begin a lecture or a paper on the above named subject by a lengthy discussion of how to pronounce Glad-i-o-lus. Everyone has a different pronunciation of the word and all the different ways invariably seem to be correct. I am convinced that we should pronounce the Glad-i-o-lus, the "King of the Flowers," in the same way as we pronounce the Rose, the "Queen of the Flowers."

There are roughly speaking two hundred original species of widely varying forms of Gladioli, many of them being native to Southern and Central Africa, and some are native to Southern Europe and Western Asia. Many of these native species are smaller and less conspicuous and much different than the introductions common in the United States today. The Gladiolus has been cultivated for more than three hundred years and has been grown for many years in Holland, England and France. The type of Gladiolus hybrid that was the forerunner of the types most common today is about 75 years old. It would take some time to give the history of the Development of the Gladiolus. The Cornell Extension Bulletin No. 9 printed in December 1916 gives the Botany, History and Evolution of the Gladiolus, while Extension Bulletin No. 10 of the same year gives the Culture and Hybridization of the Gladiolus; and Extension Bulletin No. 11 gives the Varieties of the Garden Varieties. Perhaps each year of the last dozen years has seen rapid progress in the growth of the Gladiolus business in the United States and since the Quarantine Rule No. 37 against the importation of the Gladiolus except in small quantities and by special permit for propagation purposes for getting new varieties and for scientific use, there has been still greater growth of the industry. Millions of bulbs are now raised annually in the United States by many growers who plant from one to one hundred acres.

The weather conditions are somewhat more favorable here than in Holland as we have less fog and more sun in this country.

One of my flower friends has recently suggested that the principal Gladioli in commerce of today might well be divided in four classes.

Very large or decorative types.
The Florist or Cut Flower types.
Much Ruffled types.
Primilinus types.

Some of the growers of today feel that the attempt at great size is really being

overdone. The Decorative and Cut Flower types would comprise several thousand of the about 4,000 named varieties. The much ruffled types are much in demand and the Primilinus types are likely to be more and more in demand for their extreme gracefulness and beautifully tinted colors.

During the past few years the Gladiolus Breeders have been very busy and hundreds of thousands of crosses have been made and millions of seedlings have been raised and several thousand new varieties have been named. Clark Brown's Nomencature of Gladioli gives over 4,000 varieties with the name of the breeder or introducer, the color, height, lengths of time required for flowering and other valuable information.

PLANTING

In the north we plant Gladioli anytime during the Spring when the ground begins to warm up a little and is in good condition. In New England we sometimes get in a few for early bloom as early as April under glass and sometimes as early as the 10th or 15th of April in the open. In Florida bulbs may be planted almost any month during the year, but usually the planting begins in October and can be continued for several months.

Several growers in Florida have had considerable trouble about getting their bulbs to sprout evenly and come up and bloom all at the same time. Mrs. Geo. J. Backus, of Stuart, Florida in her paper on *Bulb Culture in the South—The Gladiolus*—beginning on page 47 of the Proceedings of the Second Annual Conventions of the Florida State Florist's Associations at Orlando, Florida, April 16-17, 1923 says in part:

"The greatest thing to be overcome in growing the *Gladiolus* for the cut flower market, is the keeping over of the old bulbs in this climate. Our bulbs, when dug, are heavy, plump, clean bulbs, better usually in appearance than those shipped from the North, but for some unaccountable reason when planted take forever in sprouting and when they do come up are very uneven and make a small percentage of bloom. Some varieties not coming at all. Many come blind and others with inferior spikes which when examined are found to sprout from the side instead of the center. I do not mean that there are no good spikes for there are many, especially the America which are far better than those from the northern bulbs. The bulbs from these plantings are very good but you can see from a commercial standpoint they would not pay. The expense of planting, fertilizing and cutting a few spikes each day from November to June, while the bulbs shipped from the North come up readily—come almost as one plant bloom—in the same way are marketed and over within a short period while the old bulbs still bloom on one at a time. This long drawn out blooming season would all be very pleasant if it happened to be for simple pleasure that we were working."

Florida growers of the Gladiolus will do well to read this entire article by Mrs. Backus and the further discussion of her paper by Mr. Godbey, Mr. Baum, and Mr. Richardson on pages 49 and 50 Also Mr. Richardson adds something on the

subject of the Gladiolus on page 86 of the same publication.

This question of getting the bulbs to sprout at the same time and come up and bloom evenly so as to be ready for market is naturally a question of greatest importance and can probably be easily solved by a little experiment or a little experience by the Florida Growers Early in March this year I visited Mr. F. B. Mills, Proprietor of the Colonial Gladiolus Gardens, on East Colonial Drive, Orlando, Fla., and also Mr. A. N. Hull of Hull Gardens, DeLand, Florida. One of these gentlemen told me that this trouble of slow and irregular germinations could be cured very effectively by proper refrigerations. We all know that Gladiolus bulbs do much better by having a proper resting period during which they are properly dried out and cured. It seems of greatest importance also that the bulbs should be cooled. Here in the North the bulbs are kept in cool storing cellars during December, January, February and March (with great care that they shall never be frozen) and they germinate and come up and bloom very evenly and satisfactory. In Florida they should be put in some sort of a refrigerator or cooling room for a period the best length of time for same to be determined by experiment or experience, probably about a month. Mr. Forman T. McLean in an article on the "Behavior of the Gladiolus in the Tropics," in the Garden Magazine of August 1923 spoke of the necessity of putting certain bulbs on ice before he could make them sprout and grow. Mr. Beattie of the Federal Horticultural Board of the U. S. Department of Agriculture at Washington, also spoke of the necessity of placing certain bulbs in a refrigerator before they would sprout. It would be of interest to know just why this treatment of refrigeration is of value during the dormant period. It is sometimes said that peonies and Dahlias and bulbs bloom themselves to death in Florida. Is it not possible that this is simply due to the fact that they are not cared for and cultivated and fed and taken up and divided when the roots have filled the ground and exhausted all the strength?

I think Mr. Mills told me that he had been raising seeds and bulbs for about 38 years in New York State and has been raising Gladiolus bulbs several years at Orlando and he saw little difference in the bulbs raised in Florida and in the North and little difference in the mode of culture. He shows about 38 varieties in a recent Trade List and several pictures of Gladioli in bloom. The blooms look good but I think there are usually not so many florets on a spike as are usual in the North.

While driving between Sanford and DeLand I passed a planting of about 5 acres of Gladioli early in March that had been planted a few days previous on ground with underground irrigation planned I understood the same as that at Sanford where the celery land is usually arranged for underground watering.

Mr. Arthur N. Hull of DeLand, told me that he planted mostly in December and January the latter being the best, so as to avoid frosts that are somewhat likely to occur in December. He plants four inches deep in the sand or two inches deep in mud. Gladioli in the North or in

Florida require a great deal of water. Thorough watering once a week in the North is better than a little watering every day. I should think it might be better to water oftener than once a week in Florida and that the underground system as practiced in Sanford would be much better than surface irrigation.

Thorough cultivation is also of the greatest benefit, never allowing a crust to form on the surface of the land. A dust mulch is of great importance. This matter is of such great importance, especially so to get the very best bulbs, that I wish to quote these short paragraphs from a book on the Gladiolus entitled, "Making Them Grow" published a few months ago by Merton G. Ellis of Portland, Oregon. Under *Cultivation* he says: "If anyone had asked me as to the purpose of cultivation, when I was a boy back on the farm, I would unhesitatingly have replied, to kill weeds. A little later, as my gardening knowledge advance, I would have said, to maintain a dust mulch so that the capillarity of the soil will be broken up and the moisture retained. But important as these purposes are, I believe now that even the more importance is the aeration of the soil so that the plant food may be the more readily available. Many kinds of bacteria are constantly at work on the soil particles, and many chemical changes take place and for both of these air is needed. I believe that the rootlets themselves need air."

Referring again to Mr. Hull of DeLand, he told me that he considered that the best land was hammock half sand and half muck. He shipped flowers to New York and occasionally to Chicago and Philadelphia getting ten to twelve cents per pike at wholesale. He uses bone meal and goat manure, whereas we use a considerable amount of sheep manure pulverized and electrically treated to kill weed seeds and good stable manure well rotted and kept from contact with the bulbs. Mr. Hull told me that he planted his bulblets in the spring and with the long season it was a common thing to have most all of them blossom in the fall with three to five florets on the spike. Good bulbs can be raised in Florida two to two and a half inches in diameter that are plump and hard and with high crowns when raised in muck land.

In the North we speak of using potato land for Gladioli and speak of storing them in about the same temperature as potatoes but we do not allow them to be stored one upon another over four inches in depth. We usually plant in rows—single or double, if cultivated by machinery or even in triple rows if to be cultivated by hand. We plant the larger bulbs about four inches deep and perhaps three inches apart. The smaller bulbs are planted not quite so deep and a little closer together. Of course they grow better not to be crowded and so the more expansive and bulbs of rarer varieties are spaced a little further apart than the cheaper varieties.

The bulblets or corms are planted much as we would plant peas in drills two inches deep, about one quart of bulblets to ten to twenty feet. Bulblets may be soaked in warm water for one to two days or longer before planting and the more expensive ones if hard to sprout may be

peeled immediately before planting, being careful however not to injure the kernel inside. The soil should be soft underneath as well as above to give the roots a chance to grow as well as the spike.

CULTIVATION

The cultivation should be very thorough, beginning very soon after planting even before the shoots appear, using a rake and being careful not to go deep enough to injure the bulbs or bulblets. Kill all the small weeds before they have much time to form and make every effort to prevent a hard crust to form for any length of time during the whole growth of the plant from the very beginning right up to the time of digging. Even after the flowers are cut keep on cultivating as this is the time for the bulb to make its final growth and develop the bulblets. Remember that the Gladiolus is a heavy feeder and requires food several times during its growth and water frequently and very much water surely just before and at the time of blooming. Weekly cultivation gives the best results in the North and some hand weeding directly around the plants gives better results than when the horse cultivator is the only means used.

CUTTING THE BLOOMS

Cut the spike so as to leave about four leaves for maturing the bulb and bulblets. Great pleasure will be had by allowing a few spikes to grow so as to mature the seed. Study hybridizing from Mr. Ellis' book or Mr. Vondels book, the Glorious Gladiolus, Sharon, Mass., and try for a new variety to be called the Glory of Florida or the Pride of Orlando.

Try to breed a Gladiolus better than Mrs. Frederick C. Peters (By Roos); or of greater value than Geraldine Farrar (By Diener); or more beautiful than Purple Glory (By Kundred); or a better white than Tiffany (By Brown.)

Dr. VanFleet once wrote of a most wonderful and happy time that he had for several summers growing several pounds (all he could lay hands on) of Gladiolus seeds—and the pleasure of looking over the resulting blossoms the second year—every blossom being a new and different creation.

Consult also "The Gladiolus for Profit" by Raymond M. Champe who raises Gladioli in Michigan in the summertime and about four miles out of Tampa during the winter months. I always like to cut the bloom when one floret has opened or even when the color begins to show if for shipping. I like to cut Gladioli and let them bloom in the house, changing the water each day, breaking off each floret as it wilts, and cutting off the lower end of the spike at a slanting angle each day so that fresh water can readily get into the spike and up through the stem to the florets.

DIGGING

Dig when the foliage has ripened or has been killed by frost. Cut off the top leaving about three eights of an inch of the spike above the bulb. Loosen the earth each side of the bulbs with a spade and then lift the bulbs with their bulblets. If left in the ground too long the bulblets often drop off and the earth must be shoveled into screens to get the bulblets. The bulbs and bulblets may be put into

screens or boxes and allowed to be dried out by air and sun and then can be easily separated from the earth by screening. Dig and store carefully in a cool dry place, but the most important digging is the digging into the whole subject of the "King of the Flowers." Dig into hybridizing, dig into the newest and best varieties especially those best suited to Florida.

Florida although a very young state has bred oranges with more juice than can be had from California oranges and grapefruit that are far superior. It would seem that Mrs. Backus or Messrs. Mead, Reasoner, Godbey or Poole with the wonderful climate and all things favorable should be able to make better Gladioli than can be had in California and I will admit that would be some accomplishment.

Being a member of the Symposium committee of the American Gladiolus Society (the results of said symposium to be published we hope this fall) I am much interested in the Best Gladiloi (or if there are no best Gladioli, we might say Favorite Gladioli.) And so I was interested in having our New England Gladiolus Society vote on "The Twenty-five Best Gladioli." The votes have just been tabulated and the results are as follows, the one receiving the largest number of votes being at the head of the list and the others following according to the number of votes received. A further discussion of this particular vote with possible votes by one of the members will probably be published in *Horticulture* for May 1st., probably also in *The Flower Grower and Florists Review.*

1. Mrs. Dr. Norton
2. Mrs. Frederick C. Peters
3. Mrs. Frank Pendleton
4. Gold
5. Anna Eberuis
6. Purple Glory
7. Golden Measure
8. Evelyn Kirtland
9. Marshal Foch
10. Byron L. Smith
11. Alice Tiplady
12. Carmen Sylva
13. E. J. Shaylor
14. Marie Kunderd
15. Diana
16. Peach Rose
17. Herada
18. Prince of Wales
19. Richard Diener
20. Europa
21. H. C. Goehl
22. Mona Lisa
23. Pink Wonder
24. Crimson Glow
25. Louise

I would like to offer one word of advice to anyone who contemplates making somewhat of a specialty of growing Gladioli in Florida.

Join the American Gladiolus Society. The price is two dollars per year which includes the Annual Year Book, published only for Members, and various bulletins published from time to time during the year. The American Gladiolus Society is a very live wire affair.

Yes, Florida, the Land of the Flowers, can raise the Roses, "the Queen of the Flowers," and Florida should raise the Gladiolus, the "King of the Flowers."

Chinch Bug Control on St. Augustine Grass

A. H. Beyer, Assistant Entomologist, Agricultural Experiment Station, Gainesville

The chinch bug was first recorded in the United States as an economic pest about the year 1783 in Orange County, North Carolina, where it threatened the crops in that section of the south. From this outbreak the infestation has spread each year until it covers practically the eastern half of the United States, including the Mississippi Valley, with scattering outbreaks throughout the western states.

Generally speaking the chinch bug attacks only plants of the grass family, while such crops as clover, cowpeas, peas, beans, potatoes, beets, sunflowers, and rape are immune, or practically so, to injury from this pest. This insect has created wide spread attention among landscape gardeners, civic improvement societies, and all residents of Florida who have to do with the keeping up of lawns, because of its attacks on St. Augustine grass which has been generally adopted as a lawn grass over the entire state. Because it is native to the coast from North Carolina southward to Florida, growing especially well on alluvial and muck soils, this grass is cultivated in the coast states. The scientific name is *Stenotaphrum secundatum* Walt. Lawns of this grass have a coarse texture but are otherwise satisfactory. The grass is propagated by setting out cuttings or pieces of stolens bearing shoots. The plant has a peculiar structure which consists of rather broad and short obtuse blades lapping over both sides of the stem, commencing with the axis and extending along the stem about an inch and a half. This has been observed in the writer's studies to be the point of attack made by the chinch bug upon the grass.

HOW THE CHINCH BUG INJURES THE GRASS

The chinch bug feeds on the growing grass throughout its entire life. It is armed with a four jointed beak equipped with lancelets for piercing the plant and causing a flow of sap which is sucked into the stomach. The insect, especially in the immature stages implants itself under the laterals of the close fitting leaves and in its feeding imparts a reddish stain to the plant parts attacked, and causes the death of the cells. The feeding of a large number of bugs on the growing plants, as can be seen, prevents normal growth and brings about a dwarfed condition of the plants, causing many of them to die and giving the appearance of brownish or deadened spots

in the lawn, while serious outbreaks often threaten the destruction of the entire lawn.

The chinch bug thrives best when the plants are most tender and succulent, usually during the winter months, including the late fall and spring.

HOW TO KNOW THE CHINCH BUG

The easiest way for the layman to distinguish the chinch bug is by its disagreeable odor. The full grown or adult insect has two forms, one having short wings which reach only one-half to two-thirds of the length of the abdomen, and the other having long wings which reach almost to the tip of the abdomen. Both forms are white immediately after the skin is shed from the previous stage, but they soon become black. The upper wings are whitish at the base, white at the tips and bear black spots in the center. The under wings are whitish, folded membranes. The insect is about a fifth of an inch in length. The adult may easily be distinguished from the nymph by its larger size, presence of wings, and absence of reddish coloration.

The eggs are laid in the soil near the roots of the grass. They are about .33 of an inch long and are shaped somewhat like a bean, and are of an amber color. A single female has been found to lay from 105 to 250 eggs.

The young undergo six stages in their development. It is during these stages that the insect is found implanting itself under the leaf sheaf of the grass as previously mentioned. The young, or nymphs, are without wings and have reddish coloration, but otherwise they resemble the adults in appearance. The insects move about freely and may be found on any portion of the plants until the feeding habits are established. The writer has found in his studies that there are at least two generations with an overlapping which may later prove to be a third generation occuring during the summer.

CONDITIONS FAVORING OUTBREAKS

An observation of certain weather conditions is the best indication of an outbreak of chinch bugs in lawns. Warm and fairly dry weather during the spring and fall are the most favorable periods for the abundant hatching of chinch bug eggs, as they are deposited by the females in the greatest numbers during these seasons. Destructive outbreaks are sometimes prevented by a series of drenching rains, or a prolonged rainy or humid season during the hatching period.

CONTROL METHODS

Natural control has been found to be undependable, because the chinch bug can withstand almost any conceivable climatic condition or variation. The range of temperature through which the chinch bug has been found to subsist is from 15 degrees below zero (Fahrenheit) to 135 degrees (Fahrenheit). Under these extreme temperatures, however, the chinch bugs are found to die in a few minutes.

Fungous Diseases

Fungous diseases known to attack the chinch bug, among which is *Beauveria globulifera*, are entirely dependent on the

frequency of cloudy or wet weather during the hatching period of the young bugs. This dependency upon certain kinds of weather prevents these diseases from destroying the chinch bugs in large numbers. This disease attacks many other insects and is present every year throughout chinch bug territory. Therefore it becomes abundant under favorable weather conditions without artificial introduction. Another disease which has been found of value in chinch bug control during humid seasons, and which also attacks the cutworm and other insects, is *Sorospella uvella.*

Because of the fact that these fungous diseases are dependent on weather conditions, it is readily seen that their introduction in the control of chinch bugs is of little economic value.

Predators and Parasitic Enemies

Among these the most important enemies of chinch bugs are lady beetles, trash bugs, and the larvae of lace wing flies. Ants have also frequently been found to destroy chinch bugs. No true parasites have as yet been recorded by the writer as assailing the chinch bug.

Artificial Control Measures

Since the natural enemies of the chinch bug cannot be depended upon to hold it in check, it is obvious that those who wish to keep their lawns in flourishing condition must use artificial control measures to prevent injury by this pest.

The writer's introductory experiments in chinch bug control were conducted with the use of nicotine sulphate or tobacco dust, and also the introduction of tobacco stems to the lawn. Nicotine sulphate spray was applied at the rate of one part to 800 parts of water. In most cases these experiments were not found very effective because of the peculiar nature of the insect's feeding habits upon the grass attacked, as mentioned elsewhere in this paper.

The most effective results in control were obtained by the use of calcium cyanide, a newly produced chemical, which as shown from the writer's experiments, is about half as strong as sodium cyanide, a material which must be used in enclosures, such as the fumigation of greenhouses, flour mills, or tented fruit trees. The action of this chemical when applied under normal conditions of humidity and temperature, or when applied to moist soil, is the liberation of hydrocyanic acid gas in such quantities as to destroy all insects and rodents, the period required depending on temperature and moisture.

A series of experiments were conducted with calcium cyanide by sowing the dust broadcast over the lawn. Calcium cyanide is manufactured in three forms, flakes, granules, and powdered or dust. All of these forms were used in the experiments, but the most effective results were obtained by the use of the dust. This was sown broadcast over the lawn. Different applications were made, ranging at the rate of from 60 pounds to 200 pounds per acre. The dust was applied in the heat of the day when the lawns were perfectly dry. An inspection from 12 to 24 hours after the application of the dust showed that the most effective

results were produced by the application of the dust at the rate of 150 pounds per acre. In most cases where more than 150 pounds per acre was applied uniformly over the lawn injury by burning was experienced. The best safeguard found by the writer was the use of a little lighter application and a repetition of the experiment in about five days.

METHOD OF APPLYING THE DUST

The methods used in applying the dust with most satisfactory results were first, by means of the fan or blower duster. The bellows duster was not found to be so satisfactory because of its intermittent flow of dust. Another method which was found quite satisfactory was the use of a large can or bucket with a closely fitting cover which was punctured with a 6 or 8 penny nail to form a sifter top. By this ingenious device the dust can be sifted uniformly over the lawn. Under favorable conditions the most effective killing results were from 80 to 95 per cent of the chinch bugs.

The dust should be applied when there is as little wind as possible during the heat of the day, and the operator should be careful not to get his head directly over the container, or to breathe in the dust or fumes from the freshly opened cans. Where this precaution is observed there is very little danger. If one stands on the windward side of the container there is no danger in handling the material in the open air.

CALCIUM CYANIDE

Calcium cyanide is a substance having somewhat the appearance of slate. When exposed to moisture it gives off hydrocyanic acid gas, and where sufficient quantities are applied it is deadly to all forms of plant and animal life. When calcium cyanide is applied to a lawn there is no danger of the fumes of the hydrocyanic acid gas rising in sufficient quantities to be injurious to human life since it has about the same density as air.

Whenever the application of calcium cyanide is completed the duster or sifter used should be thoroughly cleaned, as when calcium cyanide unites with the moisture in the air a reaction takes place which corrodes the metal portion of the sifter or duster, and either effects the efficiency of their working or destroys them entirely by eating holes in the metal.

Gifts

Mr. Skinner: The Secretary and myself were just about to leave the hall today, when we were met by perhaps the oldest member of the Society—at least the oldest here present—who stopped us for a moment, and said he had something to say to the Society, which he would have to say in a letter form. He presented me with a letter, and he presented the Secretary with a letter also.

I think we will let the Secretary read the letter:

April 24th, 1924

Mr. President and Fellow Members:

I ask your indulgence while I inflict upon you a little of my personal history.

At the second convention of the Florida State Horticultural Society, way back in 1888, in the absence of Secretary George L. Taber, because of illness, I acted in his place and took the proceedings of the eight sessions, in long hand, and was there elected to that office, serving until 1894 when I was compelled to resign because of lack of time to perform the duties of the position longer.

I was immediately elected Treasurer and served until I resigned, because of old age, in 1922, having served in the two offices and, consequently, on the Executive Committee, for thirty-four years.

In 1892 I employed, for the first time, a stenographer who helped to take reports of the meetings at Ormond, and that year, with the efficient help of President Dudley W. Adams, got the material into shape, edited it and had it printed in book form, as has been done ever since.

Through such close association I feel that I have a fair knowledge of the past history and most excellent work performed by this organization and I know of no other human influence that has done more towards the upbuilding of Florida's interests, added to its industries, its wealth and population and brought about the prosperity that we see and rejoice in today.

All this has been done without outside financial assistance, except that the State Commissioner of Agriculture, realizing the value of our reports for the purpose, assumed the responsibility of printing our annual reports for 1893 and 94 in book form, to be distributed as advertising matter for the State, turning over a sufficient number of copies to the Society to meet its needs.

It is usual and, I believe, the universal custom of every State in the Union except Florida, to give its Horticultural Society a substancial appropriation each year to enable it to function in a way to be of greatest help to its fruit growing interests.

This Society may justly take pride in its record.

As one of its oldest members I certainly do this and appreciating all it has done for me, I have grown to feel a very warm affection for it and for its every loyal member, especially the older ones.

That I may, by your permission, help, in a small way, to enable it to continue along the same lines, if it so desires, and add to its usefulness, I ask that I may be allowed to contribute somewhat to its income.

For over twenty-two years there has been embodied in each of my succeeding wills, a clause bequeathing the later named amount which I intended to leave to it when "The Grim Reaper" makes his final visit and my last testament goes into effect.

Though he has swung his scythe for me several times during my nearly seventy-three years, each time I have dodged, though by a narrow margin, and now, while "living on borrowed time," as Mr. Adams used to say, I feel that it is best not to wait longer for that visit but make these funds available and helpful at once, trusting that I may smile and greet him the more cheerfully at his last call.

In carrying out this thought I am now handing to your Treasurer, for perpetual ownership and use by the Florida State Horticultural Society, twenty shares, par value one hundred dollars each, of cumulative, eight per cent preferred, and ten shares of common stock of the Florida West Indies Corporation, a Tampa company that I believe has fine prospects for future profit, and ask that the Society hold possession of the stock for, at least, ten years and devote its income to hastening the publication of its reports so that they may be gotten out as promptly as possible after the adjournment of each annual convention.

In case of my unexpected death before I have rewritten my existing will, I desire that this contribution shall be considered in lieu of "Article Fifth" there in and my Administrators be allowed to add the sum, named there, to that mentioned in "Article Fifteenth."

Yours most sincerely,

W. S. HART.

Mr. Skinner: I have here a receipt from the Florida Realty & Mortgage Co., for the sum of $2,000.00, in payment of Mr. Hart's stock, 20 shares of preferred, and 10 shares of common stock.

I hardly know how to express on behalf of the Society the feelings of the Society, and the thanks of the Society to Mr. Hart. I know that his gift is dictated by one of the greatest things that man possesses—love for his fellow-man, and I think perhaps the fewer words said the better. We are just saying to Mr. Hart. We thank you, every one of us; we thank you most sincerely, and appreciate the gift that you have finally consummated, and have contemplated for so many years.

This is not the only debt the Society owes to Mr. Hart; it's the long years of service, unselfish devotion and wise advice and we wish to say we sincerely and earnestly appreciate this gift.

Member: I think it fitting at this time, under the circumstances, that this Society give a rising vote of thanks to Mr. Hart.

(Rising vote of thanks given to Mr. Hart.)

Annual Reports

REPORT OF AUDITING COMMITTEE

To the Officers and Members of the Florida State Horticultural Society, Tampa, Fla.:

We, the undersigned members of your auditing Committee, beg to report that we have examined the books, vouchers, receipts and bills of the Secretary and Treasurer and find them to be correct as follows:

Secretary's Books

Total moneys collected		$2,395.97
Bills and Expenses	$1,102.69	
Remittances to Treasurer	1,293.28	$2,395.97

Treasurer's Books

Balance on hand April 19, 1923	$ 2,106.52
Receipts	1,463.89
Total	$ 3,570.41
Disbursements	2,193.94
Cash on hand	$ 1,376.47
Liberty Bonds—Snell's National Bank Winter Haven	3,100.00
Total Assets, April 24, 1924	$ 4,476.47

We find that the Secretary and Treasurer are now bonded by the Fidelity and Casualty Co. of New York, for $2,000 and $5,000 respectively.

Respectfully submitted,

A. R. SANDLIN,
C. H. THOMPSON,
L. A. HAKES.
Auditing Committee

Tampa, Fla., April 24, 1924.

REPORT OF TREASURER

April 22nd, 1924

Statement, Florida State Horticultural Society

Receipts

1923		
April 19, Balance in bank		$2,106.52
1924		
Feb. 6, from Sec. Floyd	260.00	
Feb. 6, from sale five Reports	5.00	
April 22, from total int.	165.61	$2,537.13
April 24, from Sec. Floyd		$1,033.28
		$3,570.41

Expenditures

1923		
June 6, Mrs. Rock, salary	$ 150.00	
June 19, Sec. Floyd, salary	200.00	
June 19, Liberty Bonds	210.00	
1924		
Feb., E. O. Painter Ptg. Co.	1,642.94	$2,193.94

Resources

Cash from Secretary Floyd, in Savings Account	$1,033.28	
Cash, current expense account	85.31	
Perennial membership account	53.00	
Patron membership account	204.88	$1,376.47
Bonds — Patron membership Liberty Bonds, second and third issues, as per receipt from Snell National Bank attached, dated April 21st, 1924		$3,100.00

L. D. NILES,
Treasurer.

REPORT OF SECRETARY

Cash Account to April 24, 1924

Receipts		Expenditures	
Contributions	$ 589.75	Thirty-eight bills, totalling	$1,102.69
Sales	80.00	Two remittances to Treasurer	1,293.28
1923 membership	418.00		$2,395.97
Miscellaneous	47.00		
Perennial membership, extra payment	5.00		
Life membership	25.00		
Interest on bank account	5.22		
1924 memberships	1,226.00		
	$2,395.97		

REPORT OF EXECUTIVE COMMITTEE

Meeting of February 22, 1924

The Executive Committee of the Florida State Horticultural Society held its annual spring meeting in the Hillsboro Hotel, Tampa, at 1:00 P. M., on Friday, February 22nd, 1924. There were present Messrs. Skinner, Stirling and Floyd, and Messrs. Hume and Niles by proxy. Messrs. N. A. Reasoner, President Florida State Florists Association, and L. P. Dickey, Secretary Tampa Chamber of Commerce, were present as visitors.

The time for the Thirty-Seventh Annual Meeting of the Society to be held in Tampa, was set for April 22nd to 25th inclusive. The Hillsboro Hotel was named as the headquarters for the Society during the meeting.

The proposed program was discussed in detail. Since the week of April 20th has been set as a time for celebrating National Garden Week throughout the United States, it was decided to make up a program for the opening session that would have particular reference to the event.

Mr. W. W. Yothers was nominated and elected Assistant Secretary of the Society for the year 1924.

The Secretary was instructed to employ such help as was necessary for the preparation of the Annual Meeting.

There being no further business the Committee adjourned.

Meeting of April, 24, 1924

A meeting of the Executive Committee of the Florida State Horticultural Society was held in the Tampa Bay Casino on Thursday, April 24th, 1924. There were present Messrs. Skinner, Stirling, Niles and Floyd. Messrs. Coult, Poole and O'Byrne were present as visitors.

The Secretary was instructed to proceed with the publication of the Proceedings, publishing a number one hundred in excess of the actual membership at time of going to press.

Plans for increasing the membership of the Society were discussed in detail.

The name of Mr. Louis P. Bosanquet, a member of the Society since its beginning, was recommended for Honorary Membership, and was referred to the Society for action.

There being no further business, the Committee adjourned.

Election of Officers

On Thursday evening, April 24, 1924, the following officers were elected by the Society to serve during the calendar year of 1924:

President—L. B. Skinner, Dunedin.
Vice Presidents—Wm. J. Krome, Homestead; S. F. Poole, Lake Alfred; Wm. L. Wilson, Panama City.
Secretary—Bayard F. Floyd, Orlando.
Treasurer—L. D. Niles, Lucerne Park.
Executive Committee—Frank Stirling, Gainesville; B. L. Hamner, Tampa; H. Harold Hume, Glen St. Mary.

Selection of Meeting Place for 1925

Official invitations were extended the Society to hold its Thirty-Eighth Annual Meeting in their city by Eustis, St. Petersburg, DeLand and St. Augustine. Eustis was unanimously selected as the meeting place for the 1925 meeting.

Mr. A. B. Sandlin: We will donate $25.00 to tthe County Chamber of Commerce or County Agent of the County who brings in a bigger membership than we do.

Reports of Committees

REPORT OF COMMITTEE ON EDUCATION

The undersigned, as members of the Education Committee, appointed by President L. B. Skinner to consider the needs of the work of the State Agricultural Experiment Station and of the Bureaus of Plant Industry and Entomology of the U. S. D. A. as carried on in Florida, submit as recommendations for consideration by the Florida State Horticultural Society the following:

First. That larger appropriations should be secured for support of both, as the horticultural industry in Florida, where soil and climatic conditions are different from those in other states makes necessary a vast amount of experimental and research work in order to protect and develop the industry.

Second. The State Agricultural Experiment Station should have a strong department of horticulture, with a very competent horticulturist at its head to supervise all the horticultural investigations. Under existing conditions the Station is attempting some work along a number of horticultural lines but the activities are not unified or correlated and the Station is not in position to carry on investigations in connection with a number of important industries regarding which it is imperative that the people be furnished reliable information. This is true in the case of the grape industry, the banana industry, investigation of the small bush fruits, such as dewberries, blackberries, etc., the growing of bulbs in a commercial way and many other industries.

A. A. Coult, *Chairman.*
Wm. J. Krome.

REPORT OF COMMITTEE ON PLANT QUARANTINE

Your committee, having been only recently named and being a new committee, has been somewhat at a loss as to the nature of the duties it is expected to perform. In the absence of any precedent for a report of this kind to the Society from a standing committee, we have assumed that our duties consist of studying the measures, both federal and state, which are intended to afford protection against the introduction into or the spread within the state of dangerous plant pests and of the methods made use of in applying these measures; also to offer criticisms of a constructive nature and suggestions for the betterment of the protective service.

With this conception of our duties, your committee has investigated, as well as it could, the general plant quarantine situation. This is a subject of such magnitude and of so great importance to the horticulturists that it is deserving of more than passing attention. The endeavor of the committee has been to ascertain the essential facts of the situation and to present this information to the Society as briefly as possible.

We find that protective measures are of both state and federal origin. The federal protection is through the activities of the Federal Horticultural Board, while the State Plant Board functions for the state. The activities of each organization are of both an external and internal nature; that is, foreign and domestic. The domestic measures also are of two kinds: Those which apply to interstate movments and those which are intrastate. The nature of the protective measures may be classified as (a) regulatory or restrictive and (b) prohibitive or exclusive.

The scope of both the federal and state laws is such as to permit the rules and regulations of these organizations to apply to all plants, plant products and other materials which might serve as carriers of plant pests.

Your committee is pleased to report that the plant quarantine authorities appear to be functioning zealously and efficiently. The limitations are traceable to inadequacy of financial resources. This is particularly so, in our judgment, with respect to the Federal Horticultural Board and, in our own state, to the work of the Nursery Inspection Department of the State Plant Board.

With respect to the Federal Horticultural Board's activities, your committee finds that all exposed ports of entry are not guarded by inspectors and at some ports the force of inspectors is insufficient. The committee recommends that the Society take cognizance of this and again request the representatives of Florida in the Congress to support the requests of the Secretary of Agriculture for appropriations for the uses of the Federal Horticultural Board.

Your committe has had opportunity to observe the work of the State Plant Board and of its several departments operating under the direction of the Plant Commissioner. Much of the information upon which this report is based has been secured from officials of the Board, although members of the committee have had opportunity to make personal obser-

vations. We feel that the State Plant Board is to be commended for its faithful efforts to protect our horticultural industries and is entitled to a continuation of the unstinted support of the Society.

It occurs to the committee that the outstanding feature of the past year's quarantine work has been the promulgation, by the Federal Horticultural Board, of its Quarantine No. 56 which prohibits absolutely the importation into this country of certain fruits and vegetables from foreign countries and allows introduction of certain other fruits only under permit. This Quarantine 56 is a companion quarantine to the Board's Quarantine No. 37, promulgated several years ago, which applies to importations of plants. The provisions of Quarantines 37 and 56 of the Federal Horticultural Board are in line with similar provisions of the State Plant Board of Florida and these federal quarantines, as well as all other federal quarantine or restrictive orders, are applied in Florida by inspectors of the State Plant Board.

GROVE INSPECTION AND CITRUS CANKER ERADICATION

In our search for information we have learned that the grove inspection and citrus canker eradication work in the State of Florida is in a satisfactory condition. The Plant Board forces engaged in this work have completed another general survey of the citrus plantings of the state without discovering any additional foci of citrus canker infection. The situation at Davie is good. Only four infected trees have been located there during the past year, the last one in October, 1923. No other infected trees have been found in any portion of the state.

The committee is of the opinion that the citrus acreage of the state should be under constant patrol and that sufficient inspectors be engaged in this work to allow complete inspection once in every two years.

QUARANTINE SERVICE

The various ports of entry of the state are manned by a force which is at present adequate to meet the demands. With increase of commerce, however, this will not be the case. The State Plant Board inspectors, who are also collaborators of the Federal Horticultural Board and apply the rules and regulations of the federal government, board and inspect annually some 5,000 vessels arriving at Florida ports. Thousands of packages of horticultural products are inspected or fumigated, or both, and the baggage of thousands of passengers is inspected in conjunction with customs officials.

Your committee believes that the inspection service along the northern border and the parcel post inspection service can and should be strengthened.

NURSERY INSPECTION

Your committee finds that the nursery inspection work is well planned and efficiently conducted. The inspections, as made, are thorough and the system of record keeping is complete. It is with regret, however, that we report that the frequency with which inspections of nurseries is made is insufficient, under the conditions which prevail in Florida, to afford the purchaser of nursery stock the degree of protection to which he is en-

titled. It is the opinion of the Plant Board officials, in which this committee concurs, that certainly at least three inspections per annum should be made of all nurseries in the state. This is not being done, owing to the limited number of men engaged in the work and the greatly increased number of nurseries with correspondingly increased acreage. We have found that between 1916 and 1921 the number of nurseries under inspection varied from 2500 to 3000, with not over 2500 acres; whereas in 1923 the Nursery Inspection Department had under observation 3700 nurseries, with 4700 acres, and no increase in the number of inspectors.

Another interesting bit of information obtained from the Nursery Inspector's records is the extent of the movement of citrus nursery stock since 1916, shown as follows:

1916 — 1,043,410.
1921 — 5,990,160.
1923 — 7,619,657.

RECOMMENDATIONS

Your committee recommends that the Society continue its policy of supporting the Plant Board and that the legislative committee make every effort to secure adequate appropriations for the continuance of the work of the Board. It is especially urged that efforts be made to have increased appropriations available for much-needed expansion in the Nursery Inspection Department.

Respectfully submitted
CLEVE F. SMITH,
Chairman.

REPORT OF COMMITTEE ON MEMBERSHIP

Whereas, Mr. Louis P. Bosanquet was in attendance at the organization of the Florida State Horticultural Society, and

Whereas, he has been a member almost continually since, and

Whereas, he has worked unselfishly and ceaselessly for the advancement of horticulture in Florida,

Be It Therefore, Resolved, That the Committee on History recommends his election as an honorary member of the Society.

Passed.

F. M. O'BYRNE,
Chairman.

Resolutions

HORTICULTURIST FOR EXPERIMENT STATION

Whereas, The State Agricultural Experiment Station of Florida has never had an appropriation for employment of a competent horticulturist to head and supervise all the desired horticultural investigations for protection and development of the various allied industries.

Therefore Be It Resolved, By the Florida State Horticultural Society, in session in Tampa April 24th, 1924, that this Society endorse and recommend to the Board of Control and to the next Legislature, creation of a Department of Horticulture and appropriations therefor sufficient to carry on the work in such a department.

Introduced by Resolutions Committee.
Passed.

Mr. Krome: Now before this resolution is acted upon I would like to say just a word or two in connection. I wonder how many members of this Society are aware of the fact that in this State—a state in which its horticultural interests are, we might say, predominant—that the Experiment Station of this State has actually no Horticultural Department; is not equipped, or is very meagrely equipped, to take care of our horticultural interests. I doubt whether a dozen persons in this audience know, or have known, of the fact that our State Experiment Station has no Horticultural Department, has no regularly employed horticulturists.

Take our program for the last two or three days, go right down that program. We have had papers on Avocados; we have had papers on Mangos, on bulbs, addresses about bananas, about grapes, about citrus fruit stocks, about satsumas, about this and that—fruits, berries and ornamentals. But if you write to our State Experiment Station and ask them for up-to-date information on those subjects, nineteen times out of twenty, they have got to dodge it, because they are not equipped with a Horticultural Department, nor with men to answer these horticultural questions that mean so much to the development of this State. The very best that our Experiment Station can do for our horticultural industries, after immense amounts may have been expended by individuals in experimentation and attempted development, and finally getting into all sorts of troubles, is through some special appropriation, generally secured by the fellows who have gotten into trouble by trailing around and trying to find out something—something that should have been found out in advance.

How about this bulb industry, which might mean so much? You can write to

Gainesville, and they will have to tell you that they know practically nothing, and that they are not in a position to find anything out.

In the last two sessions of the Legislature, there has been prepared in the budget by the State Plant Board and the State Board of Control, appropriations which it was expected would provide for a Horticulturist to head a department in the Experiment Station, or take an initial step in that line, but the State of Florida hasn't been able to see its way to provide those funds.

I understand the Director of the Station at Gainesville has an Assistant Horticulturist whose time is taken up really with jobs that belong to an ordinary laborer, who has to practically get out and do almost pick-and-shovel work himself, and that that practically comprises the Horticultural Department of the Experiment Station of the State of Florida.

It isn't a case of there not being a proper demand on the part of our State Board of Control; it's simply a case that we are not backing up that Board of Control. I am quite sure that the Horticulturists of Florida have not really appreciated that situation.

There is another phase to it that I don't believe they fully understand. That is the function that is performed in this State by our State Board of Control and our State Plant Board, the personnel of which is the same. The direction of practically all of our State Educational Institutions, the control of all their funds, has been for a large number of years in the hands of our State Board of Control.

Along about eight or nine years ago, during the time of dire emergency, a committee from this Society, with a committee from the Florida Growers and Shippers League, formulated a bill known as the Florida Plant Act, and the provisions of that Plant Act were supposed to take care of the emergency then existing, and to a very large extent prevent a repetition of such an emergency. That committee worked pretty hard on that bill, and there was one point in particular with which they had a good deal of worry. It was known that there was going to be opposition to a good many of the regulations that were to be brought about by that law. It wasn't any time to get matters tied up in a legal way; it was feared that the constitutionality of the Board or of the committee, or whoever it was who had to execute and administer the provisions of that bill, might be attacked, and that the work that was expected to be done might be indefinitely tied up, and a good many of you know that Citrus Canker wasn't waiting while we fought out these matters.

The one way out seemed to be to have the constitutionality of the State Plant Board determined in advance, which was done. I became familiar with that State Board of Control some ten or twelve years ago. Afterwards I became decidedly more familiar with it, and I want to say that that is a body of men of which the State of Florida can be immensely proud. It is one of the strongest arguments for a Democratic form of Government that I know of anywhere.

I don't know of any other state that has a body of men who serve absolutely without pay, or give an immense amount of their time, a lot of their thought, and the best of their ability to their state as

unselfishly and as fully as your State Board of Control and the State Plant Board. It has been a body of men that has for years functioned for you without your hardly knowing it was in existence, and that Board has announced in its budget for the last two sessions of Legislature a request for an appropriation to establish a Horticultural Department for your State Experiment Station. A great big Horticultural state like Florida has just asked for a good start on a Horticultural Department in the Experiment Station, and our very careful Legislators at Tallahassee have cut that out.

Our State Board of Control can't do a thing. The only thing we can do to get it back in there is by forcing public opinion on those Legislators, and I don't want this resolution adopted by the Society unless the members of this Society are going to get behind it, and see that it means something.

Before the Society meets again our Legislature is going to be in session. There is going to be another budget up, and if the individual members of this Society don't do something to protect the horticultural interests of the State in this, and other ways, we are going to get cut out of the budget again.

Mr. Skinner: You have heard the resolution, which has been moved and seconded, and adopted. That carries with it the obligation of every member of the Society to get behind the Legislature and try to see it carried through.

FORESTRY AND EXPERIMENT STATION ENDOWMENT

Whereas, The Florida State Horticultural Society has previously gone on record favoring a measure sponsored by the Florida Forestry Association for creation of a State Board of Forestry, which failed of passage at last session of the Legislature.

Resolved, That previous position be reaffirmed by the Society, and be it

Further Resolved, That the Society thank Senator Duncan U. Fletcher for introducing and getting passed by the United States Senate Forestry Legislation beneficial to this State, and request our Congressmen to support the measures in the House of Representatives.

Whereas, There is pending in Congress a measure known as the Purnell Bill, providing additional appropriations for the more complete endowment of agricultural experiment stations, without condition that the increased allotments shall be offset by State appropriations.

Therefore Be It Resolved, By the Florida State Horticultural Society in session at Tampa on April 24, 1924, that endorsement be given the measure and this action be made known to our Congressmen and Senators and to all other Congressmen and Senators who may be enlisted to support the measure.

Passed.

FLORIDA DEVELOPMENT BOARD

Whereas, The Florida Development Board, the State Chamber of Commerce, is a non-profit organization supported by individuals, firms, corporations, commercial organizations and other agencies working to unite all sections of the State in closer co-operation for development of the State's resources, and

Whereas, The Florida Development Board during its four years of existence has done much for the horticultural interests of the State, therefore be it

Resolved, That the members of the Florida State Horticultural Society in annual meeting assembled at Tampa on April 24, 1924, give a vote of approval to the Florida Development Board for what it has accomplished and recommend to our executive committee that they effect affiliation by taking out a membership therein, so that there may at all times be a close co-operation in efforts relating to the horticultural interests of the State.

Passed.

Final Resolutions

Resolved, That the Florida State Horticultural Society extend their appreciation to L. P. Dickie, Executive Secretary of the Tampa Board of Trade; W. H. Knull, Russell Kay, C. W. Lyons, and Hillsboro County Beautification Committee for handling the local arrangements of our meeting, and for many courtesies extended to our members, during our visit in Tampa, April 22-24, 1924.

Be It Further Resolved, That the appreciation of the Society be extended to Mrs. N. W. Hensley, President of the Tampa Federation of Women's Clubs, and all others who arranged for staging Tampa's first annual flower show, a most attractive feature in connection with our meeting.

Resolved, That thanks be given Tarr Furniture Co., for lending furniture for convenience of the officers and speakers.

Resolved Further, That thanks be extended to Tampa Tribune, Tampa Times, Florida Grower, Citrus Industry, and all other newspapers throughout the State for publicity given to horticultural developments and to this meeting.

A. A. COULT,
T. R. ROBINSON,
Resolutions Committee.